

THE RUSH.  
Property of G. C. DUFFELL, Esq., Liverpool.

[Frontispiece]

ELEMENTARY LECTURES  
ON  
VETERINARY SCIENCE

FOR  
AGRICULTURAL STUDENTS, FARMERS,  
AND STOCK-KEEPERS

BY  
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*FOURTH EDITION*



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TO  
GEORGE C. DOBELL, ESQ.  
LIVERPOOL

AS A TRIBUTE OF HIS GREAT LOVE OF THE HORSE  
AND IN ACKNOWLEDGMENT OF A LIFE-LONG FRIENDSHIP  
THIS WORK IS DEDICATED.

## PREFACE TO FOURTH EDITION

OWING to the increased popularity of this work as a text-book amongst students attending the Agricultural Colleges (both Home and Colonial), the Third Edition issued in 1908 has been taken up so readily that a Fourth Edition has already been called for.

For technical reasons it has been found necessary to redraw all the Plates. This has been ably accomplished by Mr. D. C. Bluett, of Prestwood, Great Missenden; and as the Author holds strongly to the old view, that the Eye is more faithful than the Ear, a few more typical illustrations with reference to the horse have been added, viz.: 'Choking,' 'Lockjaw,' 'Loop Twist and Knot of the Small Intestine,' 'A Collection of Intestinal Calculi,' 'Rheumatic Periostitis of the Neck Bones,' 'Fracture of the Long Pastern,' 'Parasites,' etc.

The text has also been carefully revised throughout, and many paragraphs enlarged, whilst special reference has been made to the new mode of treatment and prevention of disease by Vaccine and Serum Therapy, or the inoculation of animals with specially prepared Vaccines and Serums.

It is hoped that the improved form in which the work is now issued will make it even more useful in the future than it has proved in the past.

HENRY THOMPSON.

ASPATRIA,

*January, 1913.*

## PREFACE TO THIRD EDITION

As the First and Second Editions of this work, published respectively in 1895 and 1902, have met with such a ready sale both at home and abroad, and the demand for the book has been so encouraging, I have been induced by the publishers to issue a Third Edition. I have thoroughly revised the earlier work, rewritten and enlarged the articles on Anthrax, Actinomycosis, Bots, Braxy, and Louping Ill in Sheep, White Scour in Calves, etc., and rearranged the paragraphs on The Derangements and Diseases of the Generative Organs. Several new plates have been added, showing microscopic sections of the Anthrax Bacilli and Actinomycosis, with photographic blocks of Tubercular Disease of the Spleen and Mesentery of the Horse, of Bots, Fœtal Monstrosities, Strangulated Intestine, etc., so that the work may now be looked upon as being not only an up-to-date text-book for the agricultural student, horse-owner, and stock-breeder, but also as a ready reference for the rising young country practitioner.

As stated in the Preface to the First Edition, I still hold to the opinion that it is the duty of veterinary surgeons to instruct their clients as to the best mode of preventing diseases among their stock, and to caution them against the injudicious use of advertised patent medicines; also, when the nature of a case is not clear, to call in without delay the aid of the qualified practitioner.

The work being originally the outcome of lectures, the old titles are still retained in the place of chapters, and to make it more serviceable for ready reference the paragraphs are numbered and a definition of each separate malady given. The book is divided into twelve sections, supplemented with appendices and an exhaustive

index. Each section is devoted to one particular portion of the body. The general anatomy and functions are briefly reviewed, followed by a description of the symptoms and 'First Aid' treatment of the various ailments common to the part.

The appendices are divided into three—(A) Synopsis of Diseases: their Recognition and 'First Aid' Treatment; (B) Medicines: their Terms, Actions, Formulas, and Doses; and (C) Various Forms of Manual Aid, Instruments, and Operations.

I would specially note that, though the work is primarily based on half a century's practice, I have also referred to the works and publications of various authorities, and trust this general reference will be accepted by all as an acknowledgment of my indebtedness.

The illustrations have been prepared by Mr. J. Murray, of Edinburgh, to whom I am indebted for the care taken in their production.

H. THOMPSON.

BRACKEN VIEW, ASPATRUP,  
December, 1907.

## PREFACE TO FIRST EDITION

THE idea of issuing, in book form, these Lectures—which were delivered at various centres, by instructions from the County Councils of Cumberland, Westmorland, and Lancashire—was first suggested by A. B. Dixon, Esq., J.P., Abbot's Reading, near Ulverston, the Chairman of the meetings at Bouth. Shorthand notes of the lectures, taken at the time of delivery, form the basis of the book.

The work is of an elementary character, and the remarks on the various subjects brief, thus making it suitable for the use of students attending agricultural colleges, and for farmers and stock-keepers generally.

Although much adverse criticism has been advanced as to the wisdom of veterinary surgeons giving lectures and demonstrations under County Councils, the author considers that it is a duty, not

only to instruct the people as to the best modes of preventing disease, but also to caution and guard them against the use, amongst their stock, of advertised quack medicines, the composition of which they know nothing.

It is well known that persons are found who profess to know something about diseases and the action of medicines, and when an animal is found ailing such individuals make an attempt to cure. Knowing from experience the often disastrous results from such treatment, the author has, as first aids for some of the maladies, recommended simple remedies, which, in practice, have been found beneficial.

Many of the ideas put forward are by no means generally accepted, notably the writer's opinion of germs and their action on the animal economy; he still holds that certain hygienic conditions and environments are required to render the body of the animal favourable to the entrance and subsequent development of these microbes.

To make the text more plain, especially in the case of Parturition, pen-and-ink illustrations (the work of amateurs) have been added.

H. T.

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# VETERINARY LECTURES FOR AGRICULTURAL STUDENTS

## LECTURE I

### INTRODUCTION

1. ALL the functions and actions of a living body are, more or less, due to a stimulus or irritant of a vital character directly or indirectly applied ; and from the peculiarity of the magnetism which surrounds our globe, and its influence on inorganic and organic material, **electricity** may be looked upon as *the* vital stimulus of organic life. From electricity we have light, heat, motion, etc., and by its agency the two great important gases, *oxygen* and *hydrogen*, are combined to form water ; again, by its aid water can be decomposed into its elements. Thus, then, we derive from electricity light, heat, moisture, and motion, *the essentials of vitality*. By the aid of electricity, also, sensation and motion can be restored to a partially paralyzed limb ; and when the electric current is made too powerful life is destroyed. There is also to be considered the extraordinary action of the X rays.

2. **Life** may be defined as an electro-vital phenomenon peculiar to an organism which includes the powers of *absorption*, *assimilation*, *secretion*, *excretion*, and *reproduction* ; and **death** is the cessation of all these functions, with the return of the organic tissues to their ultimate elements.

3. **Chemistry**.—On the various constituents of the living body being subjected to chemical analysis, some sixteen of the elementary bodies are found to enter into their composition, and are as follows : Oxygen, hydrogen, nitrogen, carbon, potassium, sodium, calcium,

magnesium, lithium, manganese, sulphur, phosphorus, iron, chlorine, silicon, and fluorine. These inorganic bodies, which vary very much both in proportion and combination, are not in themselves alive, yet by their subtle physico-chemical affinities, their atomic electro-activity, or vital combination (vital force), all the gases, fluids, and solids of the organic structures of the living body are produced.

4. **Cell.**—A minute sac containing a fine network of granular protoplasm. Cells vary in formation according to the structure in which they are found. A simple cell, whether vegetable or animal, seems to have an innate power of a vital character to reproduce, and by the multiplication, when the surroundings are replete with every necessary, tissues and the various organs of the body are formed, and when all are in normal condition healthy functions are carried on.

5. **Microscope.**—By the aid of this instrument the cells of the various tissues are revealed and recognized, and they are almost innumerable. Meinert estimated the grey matter of the brain alone to contain no less than 600,000,000 cells; and, again, each cell was divided and subdivided into molecules and atoms respectively, while between two and three hundreds of trillions of red and white corpuscles were found in the blood of the adult horse. The living body is strangely and wonderfully made.

‘It is strange that a harp of a thousand strings should keep in tune so long.’

6. **Histology** is a description of the minute structures of the body, and is not the province of this work. Yet before we can undertake the treatment of the various afflictions which domestic animals are prone to, and which are studied under *pathology*, a knowledge of *anatomy* and *physiology* is necessary. But this will be of a very brief and practical character, the object being that, when describing the different ailments, some little idea of the parts of the body alluded to may have already been gained.

7. **Anatomy** treats of the various portions and structures of the body, and is both general and descriptive, comparative and morbid. General or regional anatomy deals merely with the name and situation of the different organs and parts of the body. Descriptive

anatomy enters into a minute detail of their forms and structures, and gives a systematic description of the parts; while morbid anatomy is the study of diseased or morbid structures, and under comparative anatomy a comparison of the structures of various animals are made.

8. **Physiology** is the study of the functions or the work that the different organs of the body perform in health. Thus, the function of the liver is to secrete bile; the kidneys, urine; and the mammary glands, milk, etc.

9. **Pathology** treats of the derangements and diseases of these structures and functions, and is the principal object of this work. To make the subject better understood, it is here divided into various sections, the general anatomy and physiology of the different parts being at the same time briefly touched upon.

## ARRANGEMENT OF LECTURES.

10. The various subjects to be dealt with in these lectures will be taken up in the following order:

- (1) **Introductory.**—Inflammation; Terminations; Causes; Fever Treatment.
- (2) **Bones.**—Ligaments and Joints; Injuries and Diseases.
- (3) **Muscles (Flesh).**—Tendons or Sinews; Injuries and Diseases.
- (4) **Feet.**—Horny Hoof and Shoeing; Injuries and Diseases.
- (5) **Digestive Organs (Horse).**—Mouth and Stomach; Injuries, Derangements, and Diseases.
- (6) **Digestive Organs (Cow).**—Stomach, etc.; Injuries, Derangements, and Diseases.
- (7) **Dentition and the Use of Artificial Foods.**
- (8) **Circulation.**—Heart, Arteries, Capillaries, and Veins; Diseases, etc.
- (9) **Respiration.**—Lungs; Bronchial Tubes; Diseases.
- (10) **Nerves.**—Brain, Eye, and Ear; Diseases.

- (11) **Skin.**—Hair Follicles, Sweat Glands, etc. ; Affections ; Diseases.
- (12) **Urinary and Generative Organs.**—Parturition and Diseases.

**II. Nutrition** is the process by which all organic structures, whether vegetable or animal, are developed, replenished, and reproduced—*i.e.*, nutritive development, nutritive repletion, and nutritive reproduction. When all the various structures are in a normal condition, the body may be said to be in a state of *health*, to maintain which certain materials are necessary so as to replace the changes of matter (more or less accelerated) that are ever going on, as there is not a thought or a movement of the body without some expenditure of tissue. This tissue must be, and is, renewed by the process of nutrition, which is upheld and carried on by means of the food taken into the stomach, which, when digested and subjected to the secretions of the various glands connected with the digestive organs, is transformed into suitable material, which may be either stored for future use, or pass directly into the blood in combination with lymph from the absorbent vessels, and by means of the circulation the new materials are brought in direct contact with the minute cells of the various tissues of the body. Each cell with its atomic activity and selective power extracts its own suitable pabulum for its own special function, while it passes the waste product (debris) into the blood-stream to be eliminated from the body by the excretory organs (see Digestive Organs). In the animal kingdom, before healthy nutrition can be successfully maintained, certain conditions are required, viz.:

- (1) The part to be nourished must be in proper state of health.
- (2) The blood must be pure, and not too far distant. (There are some structures into which the blood does not go, it only flows *near*; for instance, the cartilage covering the ends of bones in the formation of joints. In such cases nutrition is carried on by 'imbibition,' or sucking up.)

- (3) The temperature or heat of the part must be normal. (If the part shows a temperature higher than the normal and natural, then healthy assimilation is interfered with. On the other hand, every one has read of a man's toes being frozen off in the Arctic regions through extreme cold, thus showing the necessity of normal heat.)
- (4) All parts must be under the control or influence of the nervous system.

12. Circumstances are, however, constantly arising which interfere with the equilibrium of these functions, and then a perverted nutritive process is established, disorder and disease being the result; hence, health and disease are so intimately blended—like daylight and darkness—that we cannot tell when one ends and the other begins.

### DEFINITION OF TERMS.

13. Before proceeding further, it will be necessary to note and define certain terms which are in general use in the veterinary profession.

- (1) **Pathology** is the study of disease and its locality—the science of the nature, causes, and remedies of diseases.
- (2) **Etiology** shows the various causes of disease—external, internal, mechanical, chemical, climatic, predisposing, predisposition, hereditary, exciting, age, sex, etc.
- (3) **Symptomatology** gives the various symptoms, negative and positive. In some cases there are very definite symptoms, which indicate clearly the nature of an ailment; in others the indications are few, and lead to no definite conclusion. In such a case the practitioner resorts to the negative method; the absence of certain symptoms shows that the malady is not so-and-so. Thus, he can exclude certain complaints from being the actual one until the choice is brought down

to a few possible diseases only. The thermometer is of great utility in this department.

- (4) **Prognosis** means the prediction of probable progress and result of a malady.
- (5) **Therapeutics** is the branch of medicine concerned in the treatment of diseases.
- (6) **Hygiene** treats of ventilation, sanitation, clothing, dieting, nursing, etc.; in fact, all items for the maintenance of health and its preservation.
- (7) **Epizootic**, or **Epidemic**, is a term used when a disease is very prevalent, attacking many people or animals at the same time—*e.g.*, influenza, pleuro-pneumonia, and foot and mouth disease.
- (8) **Enzootic** refers to diseases confined to certain localities—ague in man, red water in cows, louping-ill and braxy in sheep, etc.
- (9) **Specific** is a term used when the disease arises from some specific germ—*i.e.*, glanders, pleuro-pneumonia, anthrax, etc.
- (10) **Sporadic** refers to diseases generally, occurring daily—*e.g.*, simple inflammation of the bowels, lungs, and feet, plagues, etc.

There are other terms used, but the foregoing are quite sufficient.

14. Before reviewing some of the injuries, derangements, and diseases of the different organs of the body, I shall first refer briefly to that extensive and most important subject—*inflammation*.

15. **Inflammation** may be defined as an increased nutritive action in the first stage; secondly, perverted atomic change in the tissues of a part, with *heat, pain, redness*, and *swelling*, and is the most common disturbance affecting the organs of the animal creation. And yet inflammation, like fire or water, is a good servant as well as a bad master, and may be looked upon both as reparative and destructive. Without its aid the ends of fractured bones would not unite, nor would surgical operations result successfully, if it was not



for the inflammatory adhesive exudate that favours the formation of a new connective tissue. The practitioner performs the operation, and trusts to Nature and reparative inflammation to accomplish the rest. Wounds, however simple, in horses and cattle seldom or never heal without inflammatory action. If, however, the practitioner cannot keep the inflammation under control, instead of the reparative process, destructive inflammation may be set up. When a part is irritated, the small bloodvessels, called capillaries, first contract, then dilate, and this, by some, is said to be the first action of inflammation. But about this point there is difference of opinion, as others say the vessels dilate first. That contraction of the bloodvessels, is the first process, is well exemplified when the end of a finger is suddenly snapped off by machinery, or a gash is quickly made in the flesh, for then the neighbouring parts become perfectly pale, and no blood is seen to flow from the wound for a few moments owing to the sudden contraction of the vessels from the shock. Dilatation next takes place when the blood comes freely. If the irritation or cause be not removed, the bloodvessels become distended, and finally paralyzed. The corpuscles crowd into the part, and becoming adhesive—sticking together, as it were—induce further expansion of the vessels.

16. **Congestion**, or accumulation of the blood, now takes place with the exudation or oozing of the fluid portions of the blood through the sides of the vessels into the surrounding tissues; or the vessels may ultimately give way, with extravasation of blood into the parts, and from the consequent pressure the nerve filaments lose their controlling power, and the structure becomes changed. That the minute tissues play an important part in inflammation cannot be doubted, because the blood, before it reaches and after it leaves the inflamed portion, is the same as that in the uninflamed parts of the body.

17. The noted external local signs of inflammation are *heat, pain, redness, and swelling*.

18. **Heat** is caused by the large amount of blood sent to the affected part, and the consequent increased chemical action that

follows. The heat is not, however, so great as is thought, for temperature does not increase more than  $2^{\circ}$  or  $3^{\circ}$ ; and yet in inflamed foot there is a perceptible increase of heat. We can, however, have heat without inflammation, as the body often becomes heated from exercise or hard work.

19. **Pain** is owing to the irritation of nerve fibres, from the pressure caused by the distension of the effused blood material. Pain, however, varies in different portions of the body: it may be reflex and far distant from the affected part; in some places it is dull, as when the mucous membranes are inflamed; but when the fibro-serous or serous membranes are affected, as in rheumatism or pleurisy, the pain is most acute and at times throbbing. Bone is almost non-sensitive, but when under inflammation, from its unyielding nature, the pain is excruciating. But we can have pain without inflammation; for instance, as in cramp or spasm.

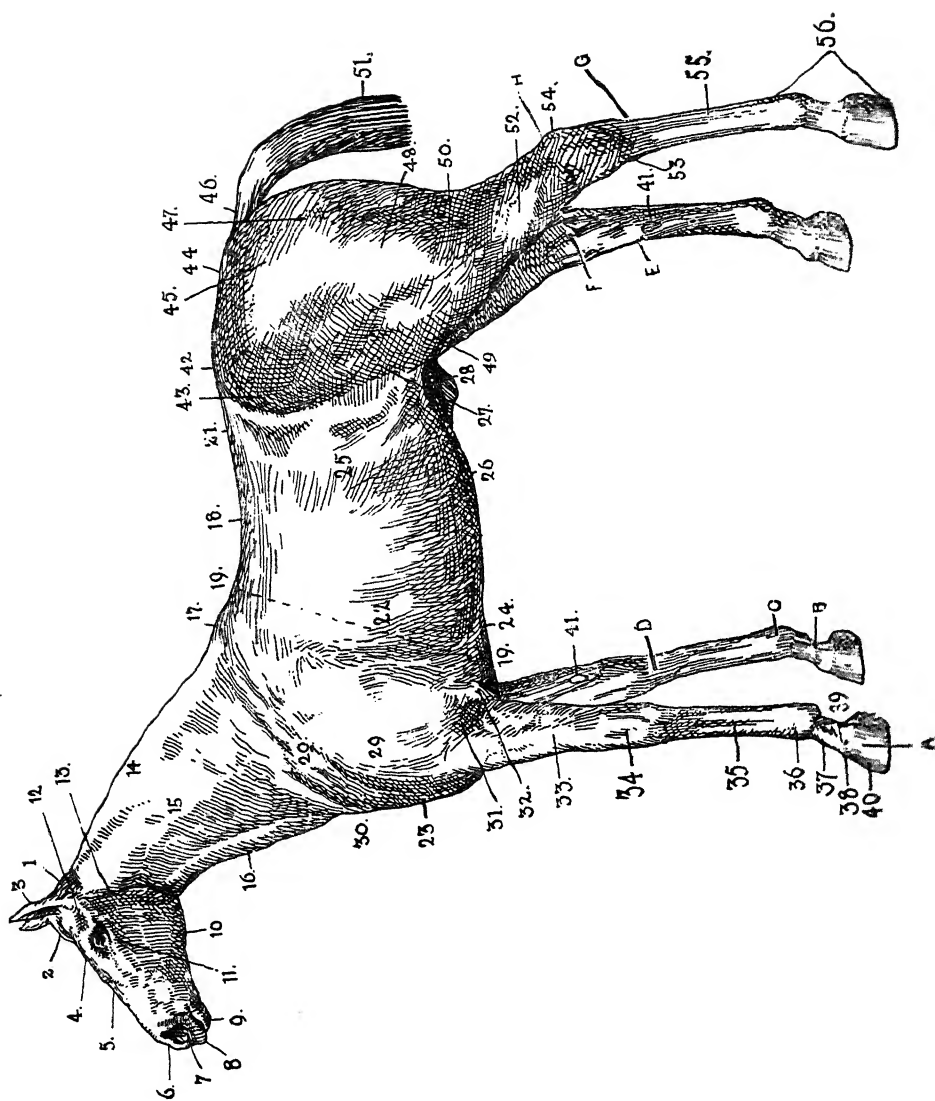
20. **Redness** is due to the accumulation of blood, coupled with a distension of the vessels and a crowding of red corpuscles in the part, and, finally, extravasation into the structures. Yet we can have redness without inflammation.

21. **Swelling** arises from many causes, but in inflammation it is occasioned by the congestion and exudation of the serous or watery portions of the blood, and extravasation of the blood itself, owing to the coats of the distended vessels giving way. Still, we have swelling in various parts of the body without inflammation—as in dropsy from debility; swelling of the legs, from plugging of bloodvessels; want of tone in the tissues; or the swellings of blains or 'howke' (nettle-rash) in cattle.

22. Yet, when all these signs are found combined—*i.e.*, heat, pain, redness, and swelling—they are characteristic of inflammation and cause more or less constitutional disturbance in the body, with a certain amount of fever, according to the situation and nature of the attack.

23. Inflammation is of various kinds, such as **acute** (sharp and quick), **sub-acute** (not quite so active), and **chronic** (of a slow

PLATE II.



## EXPLANATION OF PLATE II

### POINTS OF A HORSE

- |  |                                |
|--|--------------------------------|
| 1. Nape of the Neck or Poll.           | 29. Shoulder.                  |
| 2. Forelock.                           | 30. Point of Shoulder.         |
| 3. Ears.                               | 31. True Arm.                  |
| 4. Forehead.                           | 32. Elbow.                     |
| 5. Face.                               | 33. Fore-Arm.                  |
| 6. Muzzle.                             | 34. Knee.                      |
| 7. Nostril.                            | 35. Shank or Cannon Bone.      |
| 8. Upper Lip.                          | 36. Fetlock-Joint.             |
| 9. Under Lip.                          | 37. Pastern.                   |
| 10. Lower Jaw.                         | 38. Coronet.                   |
| 11. Zygomatic Ridge                    | 39. Heels.                     |
| 12. Hollow above the Eye.              | 40. Hoof.                      |
| 13. Maxillary Joint.                   | 41. Chestnut.                  |
| 14. Mane or Crest.                     | 42. Haunch.                    |
| 15. Neck.                              | 43. Point of Hip-Bone.         |
| 16. Throat or Windpipe.                | 44. Croup.                     |
| 17. Withers.                           | 45. Rump.                      |
| 18. Back.                              | 46. Root of Tail or Dock.      |
| 19. Girth or Chest Measurement.        | 47. Hip Joint.                 |
| 20. Shoulder Blade.                    | 48. Upper Thigh.               |
| 21. The Loins.                         | 49. Stifle.                    |
| 22. Side of Chest.                     | 50. Lower Buttocks.            |
| 23. The Chest or Breast.               | 51. Hair of the Tail.          |
| 24. Floor of Chest                     | 52-50. Quarter.                |
| 25. Barrel, Front Ribs, and Short Ribs | 52. Lower Thigh.               |
| 26. Abdomen.                           | 53. Hock.                      |
| 27. Flank.                             | 54. Point of Hock or Hough.    |
| 28. Sheath.                            | 55. Back Sinew or Tendon.      |
|  | 56. Growth of Hair—Feathering. |

### THE SEATS OF THE COMMON DISEASES ARE—

- |               |                  |
|---------------|------------------|
| a. Side Bone. | k. Spavin.       |
| b. Ring Bone. | r. Thorough Pin. |
| c. Windgall.  | g. Curb.         |
| d. Splint.    | h. Capped Hock.  |

character). Again, the temperament and condition of different animals influence the nature and degree of the inflammation. In strong, robust, and well-fed animals the attack may be of a **sthenic**, or high order, marked by morbid overaction; whilst in old, ill-fed, and weakly constituted subjects, the nature of the attack is likely to be of an **asthenic**, or low character, marked by **weakness**, thus showing how important the study of all these variations is to the trained practitioner, as they require entirely different modes of treatment. No one would think of treating a strong, robust, well-fed animal in the same way as he would a weak, debilitated one, although both may be suffering from the same complaint and show the same temperature. Our great object and aim is to bring the inflammation to its most favourable termination **with** the least destruction of tissue or life. The terminations of inflammation are said to be—(1) *Resolution*, (2) *exudation and adhesion*, (3) *effusion*, (4) *suppuration*, (5) *ulceration*, and (6) *gangrene or mortification* (death of a part). Some writers object to the phrase ‘terminations of inflammation,’ and use instead the words ‘results’ or ‘effects.’

24. **Resolution.**—Resolution means the subsidence of the morbid process. Our greatest endeavour should be to get the inflammatory action to this termination, as being the most satisfactory. If possible, find the cause and remove it, **when** the effect will cease, and the inflamed structures will return to their normal condition. For instance, when a pin is inserted into the hand, it causes pain, swelling, heat, and redness; but if the pin or irritant be removed in time, and suitable treatment adopted, the parts resume their natural healthy condition, and any exudation that may have taken place is absorbed. This termination may take place suddenly or gradually.

25. **Exudation and Adhesion.**—By exudation is meant the cozing out of certain matter, and adhesion is the force by which various bodies stick together. Reparative results are obtained by the organization of the exuded lymph, the formation of new blood-vessels, the absorption of the serous fluid, and the closing of wounds, by adhesion of the cut surfaces, etc.; but at times the result of

exudation and adhesion is most formidable, particularly when adhesive bands are formed in *serous cavities*, such as the *pleura*, joints, and the sheaths of tendons.

26. **Effusion**, or oozing of the serum of the blood into the areolar tissue, results in the formation of large serous swellings or watery tumours, with small pellets and fibrinous strings floating amongst it; for instance, the swelling that arises on a young horse's shoulder from a nip with a collar, or those on the front of a cow's knees, which at times become very large, are due to bruises and effusion.

27. **Suppuration** is the formation of a yellowish-creamy matter or pus, which is of two parts, solid or corpuscular, and watery. Suppuration is both acute and chronic, and can go on in different parts of the body, forming what are called abscesses (gatherings). A good example is seen in strangles in young horses. At first the abscesses are hard and unyielding, but, as they ripen, or come forward, they begin to soften and point in the middle, always aiming towards the external surface, and having a well-defined marginal ring. Some burst of themselves, others require to be opened, but this should never be done unless the parts fluctuate well under the fingers, and in such cases the opening should always be at the bottom. We also have *diffused* and *superficial* suppuration; the latter being seen on mucous surfaces, such as the bronchial tubes, nostrils, and generative organs.

28. **Pus** is of various kinds—viz., (1) *laudable*, (2) *putrid*, (3) *sanious*, (4) *scrofulous*, and (5) *specific*. Of these different kinds of matter—or *pus*—*laudable* is looked upon as the most healthy; it is thick, or creamy. *Specific* resembles it in colour and thickness, but is most dangerous, as in the case of glanders. The others have their peculiar characters, and need the eye and attention of the professional man to deal with them.

29. **Ulceration** may be looked upon as perverted assimilation and degeneration of the atomic structures of a part, exposing a mattery-looking sore, and is another effect of inflammation generally found in parts of low organization, short of vitality. A good example is the front of the shin bone of an aged human subject. When

ulceration of this part sets in, it seldom, or never, heals. There seems to be a dissolution, or death of the minute structures, which the natural body has not tone enough to reproduce.

30. **Ulcers** are of various kinds; viz., *healthy, inflamed, indolent, weak, sloughing, and specific*. They are not very common in domestic animals, though cattle and sheep occasionally suffer from them, as the ulcers seen on the face in *Stomatitis pustulosa*, and in foot and mouth disease. Owing to the great difference in the nature of the various ulcers, their treatment should be under the eye of the professional practitioner. Stimulating applications are required for dressing the sores, while a generous, easily digestible diet is necessary, with tonic and alterative medicine. Ulceration heals by granulations.

31. **Mortification, or Gangrene**, is the death of a part, and arises from a variety of causes, independently of being one of the results of inflammation, such as a loss of nerve power, the plugging of a bloodvessel, and the want of blood in the part, etc. We have both *moist* and *dry* gangrene. Gangrene is **moist** when the tissues undergo softening or liquefaction. It is **dry**, from obstruction of the circulation, when the parts contain little fluid; for example, **senile gangrene** in old people, affecting the big toe.

32. **Slough**, the throwing off of a dead or mortified part, which may be complete or partial. The tissues may be involved to a greater or lesser extent, when the morbid process is arrested and a line of demarcation is then formed between the living and dead structures; the dead portion sloughing off, as is seen in mares and cows when the passage has been damaged in difficult parturition; or the sloughing off of one or more quarters of the udder in mares, cows, and sheep from extensive inflammation of the mammary gland. When these occur, Nature should be left to herself as much as possible, and the strength of the patient maintained with good nutritious diet.

33. When an extensive injury has been done to any portion of the body, more particularly the thick muscular part of the hips and quarters—being torn and lacerated by some foreign body, such as a

cart or a gig shaft—the neighbouring tissues are so much damaged (the bloodvessels being destroyed and nerve fibres shattered) that the part is very liable to mortification, owing to the inflammation set up being generally so intense. Our object, and greatest endeavour, should be to keep the inflammation in check, and to give tone to the neighbouring parts, and to assist them to throw off the damaged and dead portions. The best treatment I have found is to plug or cover the external wound with antiseptic dressings, so as to exclude the air, combined with a continuous application of blankets, six or eight ply thick, wrung out of cold water every four or five hours, or when they become hot and dry, until a fine, thick, yellowish-white matter is seen coming from the wound, which generally takes place in from forty-eight to sixty hours. In my opinion, the cold water application seems to extract, and keep in check, the excessive heat usually present; in fact, a sort of endosmotic and exosmotic current is set up; the cold from the wet blanket passing into the part of the body, as it were, to which it is applied, the heat being extracted from the part to the blanket, which becomes hot; the action equalizing the temperature, and giving tone to the undamaged tissues, at the same time assisting Nature in her physiological efforts, and also the pathological action to throw off the damaged or dead portions. Hot applications, to be of any good, must be continuous. They are generally badly applied, and, in my opinion, relax the tissues, and favour the process of gangrene.

34. **Septicæmia**, the contamination of the blood with septic organisms generated in an external wound or injury, which pass into the blood-stream and induce blood-poisoning. When the part dies, and is not thrown off by sloughing, the surrounding tissues swell and have a bladder-like sound, as found in gangrene of the udder in cows and sheep; at times seen also in the latter stages of milk fever, in the hind quarters of a cow, and from an injury with an external wound, when it is accompanied with a dirty brownish, fœtid, watery discharge. There are rigors and tremblings of the body; pulse small and quick; respiration hurried; cold, clammy patches of perspiration all over the body, with head hanging down. We may then rest assured that the case is hopeless, **septicæmia**, or



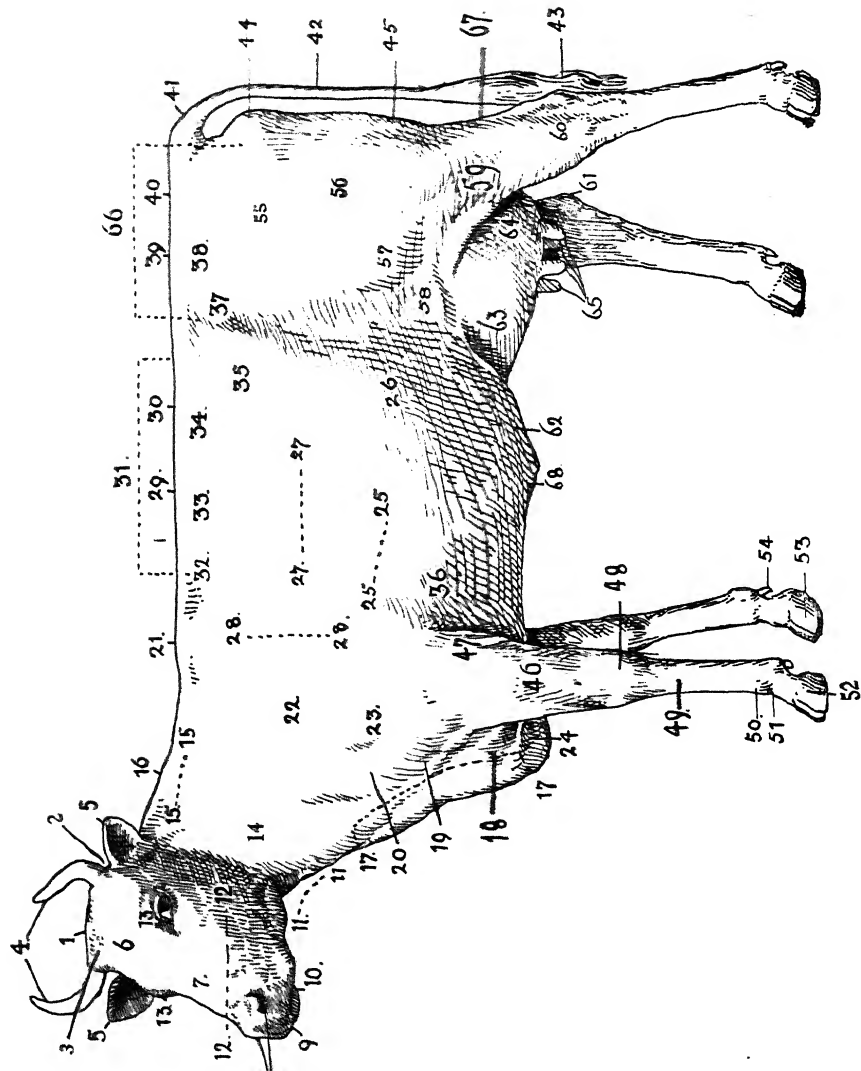
blood-poisoning, having set in. Owing to the extensive swelling, we are often tempted to scarify the distended parts by plunging in the lancet, thus admitting the air and hurrying on that process we wished most to avoid—viz., mortification, or death of the part, and also of the patient as well. All the formidable effects of blood-poisoning can, however, be induced by a very small punctured wound or scratch with a sharp instrument. **Pyæmia**, is another form of blood-poisoning, due to the micro-organisms, not only circulating in the blood, but deposited in various organs and tissues of the body, and the formation of abscesses or gatherings.

35. The **Causes of Inflammation** are various, and are termed *vital, chemical, and mechanical*. Vital causes may arise through some occult changes taking place within the body itself; chemical, from the application or use of strong acids, alkalies, etc.; mechanical, from blows, wounds, pressure, burns, etc., and inhalation of noxious gases and irritants. All the living tissues of the body are prone to the influence of inflammation; and whenever we have inflammation of any one organ or part of the body, it is always accompanied, more or less, by general or constitutional fever, which necessitates both *local* and *constitutional* treatment.

36. **Local Treatment** is the application of remedies, directly, to the affected parts, as by removing the shoes and putting on cold water bran poultices, in founder or inflammation of the feet. *Weed*, or inflammation of the absorbents or lymphatic vessels of the hind or fore leg, is another good case for local treatment, and no treatment is better than to wind meadow-hay bandages, saturated well with cold water, round the affected limb. Abscesses forming in any superficial part of the body is another illustration of the application of local treatment, which may be by hot or cold poultices, cooling lotions, salt and saltpetre dissolved in water, ice, sal ammoniac, vinegar and water, or stimulating liniments and blisters, and in a case of inflammation of the lungs, hot blankets applied to the sides.

37. **Constitutional Treatment** is the administration of internal remedies applicable to the case, and has to be adopted when there is a general disturbance set up—*sympathetic fever*.

PLATE III



## EXPLANATION OF PLATE III

### POINTS OF A COW

- |   |                              |
|---|------------------------------|
| 1. Head.                                  | 34. Back-Ribs.               |
| 2. Back of the Head.                      | 35. Upper Part of Flank.     |
| 3. Frontal Crest or Protuberance—<br>Poll | 36. Fore-Flank.              |
| 4. Horns.                                 | 37. Hip-Bone, Hooks.         |
| 5. Ears.                                  | 38. Haunches.                |
| 6. Forehead.                              | 39. Rump.                    |
| 7. Bridge of the Nose.                    | 40. Croup.                   |
| 8. Nostrils.                              | 41. Tail Head, Root of Tail. |
| 9. Mouth, with Upper and Lower<br>Lips.   | 42. Tail.                    |
| 10. Chin.                                 | 43. Tuft or Switch.          |
| 11. Throat.                               | 44. Pin-Bones.               |
| 12. Cheeks.                               | 45. Twist.                   |
| 13. Eyes and Eyelids.                     | 46. Fore-Arm.                |
| 14. Neck.                                 | 47. Elbow.                   |
| 15. Nape of Neck.                         | 48. Knee.                    |
| 16. Crest.                                | 49. Shin or Shank.           |
| 17. Dewlap.                               | 50. Fetlock-Joint.           |
| 18. Brisket.                              | 51. Pastern.                 |
| 19. Bosom.                                | 52. Coronet.                 |
| 20. Chest.                                | 53. Hoofs.                   |
| 21. Withers.                              | 54. Dew Claw.                |
| 22. Shoulder.                             | 55. Hip-Joint.               |
| 23. Shoulder-Point.                       | 56. Upper Thigh.             |
| 24. The Breast.                           | 57. Stifle-Joint             |
| 25. Walls of the Chest.                   | 58. Flank.                   |
| 26. Belly.                                | 59. Lower Thigh.             |
| 27. Barrel or Side.                       | 60. Hock or Hough.           |
| 28. Crop.                                 | 61. Point of Hock.           |
| 29. Back.                                 | 62. Milk Vein.               |
| 30. Loin or Kidney Region.                | 63. Fore Udder.              |
| 31. Spine.                                | 64. Hind Udder.              |
| 32. Fore-Ribs.                            | 65. Teats.                   |
| 33. Mid-Ribs.                             | 66. Pelvic Arch.             |
|   | 67. Purse in Ox.             |
|   | 68. Sheath in Ox.            |

38. **Sympathetic Fever.**—When fever arises from some extensive injury or wound, it is known as *traumatic* or *sympathetic fever*. A few years ago the treatment of sympathetic fever in country practice generally took the form of blood-letting, purgatives, etc., which then seemed to give satisfaction, but now a more rational mode of treatment is adopted. The personal comfort of the patient is now looked after by putting the animal into a well-ventilated loose box, free from draughts, but with plenty of air; clothing the body and bandaging the legs, and administering medicines of a saline aperient character, such as 1 to 2 ounces of Epsom or Glauber's salts, 2 to 4 drachms each of nitrate of potash and cream of tartar, with 10 to 15 drops of Fleming's tincture of aconite, given either as a draught in one pint of cold water, or in the drinking water, two or three times a day, until the bowels respond, along with a suitable cooling diet. But detail will be more gone into when considering inflammation affecting the different organs and parts of the body.

39. Town practice is different to that in the country. For instance, 4 drachms of aloes would purge a town horse, whereas it would take 6 to 8 drachms to have the same effect on one in the country. The same thing holds good in pit horses, which have to be treated similarly to town horses. Half the dose required for horses in the North of Scotland is sufficient for those in the South of England. In all cases, whether horse or cow, it is of the greatest importance to have the bowels attended to (as there is no complaint, however slight, that does not affect the bowels more or less), but greater care is needed with horses, as they cannot stand strong purgatives like cattle.

40. **Simple Fever.**—General derangement of system, characterized by a rise of temperature, hurried breathing, quickened pulse, shivering, etc., and which may arise without any obvious cause. It may be brought about through changing from field to stable, change of food, drinking cold water when the animal is heated, standing in a draught, etc., and is generally ushered in by a shivering fit that is seldom seen; but, if observed, it is advisable to at once put on

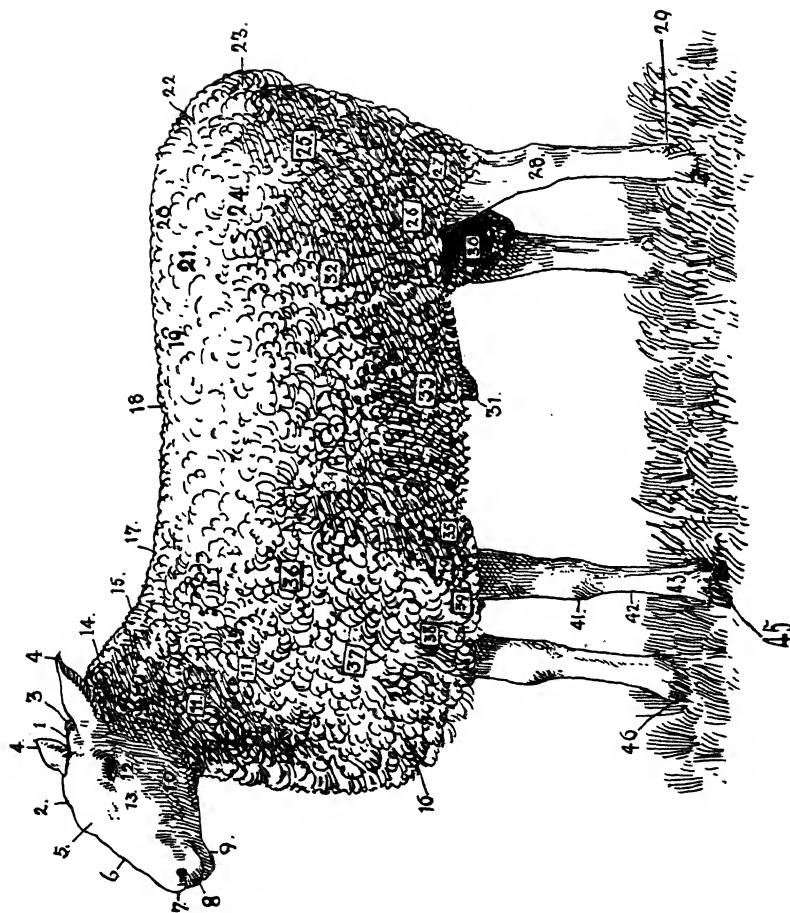
plenty of clothing and give a good stimulant, say from  $\frac{1}{2}$  to 1 pint of whisky, with the same quantity of water, or a quart of hot ale and 1 ounce ginger or fever drench (*par. 1067, No. I.*), when resolution may be brought about and the animal ail nothing further. But, as generally happens, the shivering fit has not been seen, the first thing to be noticed is the patient hanging its head, breathing heavily and hurriedly, with nostrils distended, eye bright, and temperature increased to about  $104^{\circ}$  to  $106^{\circ}$ . Endeavour must then be made to find the cause and remove it. If this cannot be done, treat the symptoms thus: Place the animal in a roomy, well-aired loose box, clothe the body, bandage the legs, and give the saline medicine named under sympathetic fever. If not better or relieved in a few hours get other advice. Sometimes when the breathing is quick and the pulse is very full and strong, and the eyelid injected and red, the taking of 4 to 6 quarts of blood from the neck may relieve the animal so much that no further treatment will be needed, except giving nitre water and soft cooling food for a few days (this I have seen done in scores of cases), but the bleeding should only be done by a veterinary surgeon. The advantage of blood-letting is that it relieves the overloaded system quickly. To depend upon purgatives for this purpose, either for horses or cattle, would be loss of time, because it takes from twenty-four to thirty hours in the horse, and frequently longer in cattle, to act on the bowels, while it is very difficult to unload the system by perspiration; therefore, early blood-letting in many cases is advantageous, at least it is so in country practice. Bleeding in the past was *abused*; in the present, as a remedy, it needs to be *judiciously used*.

41. **Septic Fever** (*sapramia*) is due to septic organisms gaining access to the system, as in **septicæmia** and **pyæmia**. Such cases are of a more formidable character than simple fever, and should at once be put under the care of a qualified practitioner, as the treatment is quite different to that of simple fever, requiring antiseptics and nourishing diet to keep up the strength. Quinine is useful, and can be given in from 1 to 3 drachm doses three or four times a day; hyposulphite of soda in 2-ounce doses, and chlorate of potash in 3-drachm doses, are also given alternately every six or eight hours,

also suitable doses of veterinary solution of **nuclein** may be injected hypodermically, and repeated if necessary to increase the action of the phagocytes or blood scavengers (*pars.* 43, 422, 423, and 426), with nourishing gruels, linseed jellies, green food carrots, hay-tea, etc.

42. From these remarks it will be seen that from the various constitutions and the different forms of disease which are met with, and the great differences in their treatment, it is quite unsafe to start and tinker with them unless the nature of the complaint is thoroughly understood. My advice is this: In the first place, get a clinical thermometer, which can be had from 2s. to 10s. each; and, when an animal is ailing, take its temperature, by passing the thermometer into the rectum. If it rises to  $104^{\circ}$  or  $105^{\circ}$  (normal temperature of the horse being  $100^{\circ}$  to  $101^{\circ}$ ; cow,  $101^{\circ}$  to  $102^{\circ}$ ; sheep,  $103^{\circ}$  to  $104^{\circ}$ ), you should lose no time in calling in a qualified veterinary practitioner, as the case may be looked upon as tending to be serious. Don't think, because your neighbour had a horse or cow in just the same state—*apparently*—last week, and some wonderful patent nostrum cured it, that yours will be set all right with the same treatment. Your neighbour's animal may have had *one* or *two* of the symptoms similar to those exhibited in your case, but yours may have others accompanying these, which can only be detected by the professional eye. Don't waste time, money, and, perhaps, the animal as well, by delay in such a case, but send at once for your veterinary attendant, and, in the meantime, do as much to relieve the animal as possible, such as putting it in an airy box, clothing well, bandging the legs, etc. This of itself will often, both in the case of horses and cattle, set them right, and the temperature will come down  $2^{\circ}$  or  $3^{\circ}$  by simply putting them alone in a loose box. Animals, as a rule, when ailing in the fields, get away by themselves in a quiet corner. Follow their example; but whatever you do, do not start and tamper with quack medicines, of the composition of which you know nothing, and which may be exactly the reverse of what is required. Try and find out which way Nature is working, and then do what you can to assist her. If you fail in this, send for your professional veterinary adviser.

PLATE IV



# EXPLANATION OF PLATE IV

## THE POINTS OF THE SHEEP

- |  |                                     |
|--|-------------------------------------|
| 1. Back of the Head.                             | 24. Hip-Joint.                      |
| 2. Horny Protuberance.                           | 25. Upper Thigh.                    |
| 3. Horns.  | 26. Stifle-Joint.                   |
| 4. Ears.   | 27. Lower Thigh.                    |
| 5. Forehead.                                     | 28. Hock.                           |
| 6. Bridge of Nose.                               | 29. Heel.                           |
| 7. Nostrils.                                     | 30. Scrotum.                        |
| 8. Mouth, with Cleft Upper Lip<br>and Lower Lip. | 31. Point of Discharge from Sheath. |
| 9. Chin.   | 32. Flank.                          |
| 10. Cheeks.                                      | 33. Abdomen.                        |
| 11. Throat.                                      | 34. Walls of the Chest.             |
| 12. Eyes and Eyelids.                            | 35. Lower Breast.                   |
| 13. Lachrymal Pit.                               | 36. Shoulder.                       |
| 14. Nape of the Neck.                            | 37. Point of Shoulder.              |
| 15. Crest.                                       | 38. Fore Part of Breast.            |
| 16. Dewlap.                                      | 39. Fore-Arm.                       |
| 17. Withers.                                     | 40. Elbow.                          |
| 18. Back.  | 41. Front Knee.                     |
| 19. Loin or Kidney Region.                       | 42. Shin Bone.                      |
| 20. Rump.  | 43. Fetlock.                        |
| 21. Haunches.                                    | 44. Pastern.                        |
| 22. Croup.                                       | 45. Coronet.                        |
| 23. Tail.  | 46. Hoofs.                          |



43. Of late years a great change has taken place in the mode of treating derangement and diseases in farm stock generally, but more especially those maladies that are now considered due to the presence of pathogenic or disease-producing germs (bacteria and their products), which gain access to the body by the medium of the food, water, inhalation, and by inoculation through wounds, etc. Bacteriologists and highly-trained scientific workers have, and are now preparing, various serums and vaccines, which are injected hypodermically or otherwise into the body, and are said to act by generating an active immunity against the corresponding living disease-producing germs. The introduction of vaccine prepared from a certain kind of bacteria into the blood results in the production of certain anti-bacterial material, called by Sir A. E. Wright 'opsonins' (*opsono* = to prepare food for). By estimating the amount of opsonins in the blood we realize the amount of phagocytosis which is going on, or, in other words, the progress of immunization. Thus the natural immunity of the body can be materially aided by administering appropriate doses of suitable vaccines at various intervals. According to Wright, the natural remedy of any bacterial disease is brought about by a series of anti-inoculations and immunizing responses, the vaccine or inoculative matter being derived from the infected or diseased portions of the body, consisting of the bacteria or their products. Each successive immunizing response leaves the body defences more reliable, and finally complete immunity is produced. Sometimes, when the bacteria are poured forth in excessive numbers and their toxins are unusually virulent, the immunization fails, and the disease-producing germs multiply in the body. In such cases appropriate doses of vaccines injected at right intervals will stimulate the production of the protective material, and bring about a cure. Of course, it must be borne in mind that appropriate and suitable vaccines must be used in each case. Thus the bacteria of disease have been combated by fortifying the resisting power of the white corpuscles of the blood (phagocytes), (*pars.* 422, 423, and 426), the stimulus used being preparations from other bacteria; but from experiments it has been found that disease-producing bacteria have been successfully resisted by chemical agents. It therefore becomes

possible to destroy the bacteria by drugs without injury to the patients, and thus the war against germic disease will be more successful than ever; hence medical agents are being specially prepared by several well-known drug firms, in fluid and tabloid forms, of standardized doses for the treatment of diseases, and are injected either under the skin (hypodermically), into the blood (intravenously), and into the windpipe (intra-trachially), and in many cases have good results. Yet, notwithstanding all this, it is, however, a well-known fact that in many instances Nature has within the body the wherewith—*vis medicatrix naturæ*—to repair and heal herself without the aid of medicine. And in respect of this I have, on many occasions, attributed beneficial changes to the simple action of common salt, owing to the patients licking the lump rock-salt placed before them, and therefrom obtaining a desire to take water and food when nothing else would induce them to do so. In all ailments, therefore, affecting horses and cattle, it will be found of great service to have a good-sized piece of lump rock-salt placed in the manger or trough for the animal to lick at leisure, particularly in febrile affections. In all cases of lameness, derangement, and disease in domestic animals, the following essentials are highly necessary: Perfect rest and quietness, proper ventilation, good bedding and sanitation, as well as drainage, and judicious feeding, and, above all, good nursing—conditions greatly needed but rarely met with in country veterinary practice.

## LECTURE II

### BONES

44. **Osteology**—the study of bones. Before entering, however, into the details of the diseases and accidents peculiar to the bones of domestic animals, I will first briefly run over the general skeleton.

45. **Bone** may be defined as a yellowish-white, hard, ordinarily insensitve substance, made up of two tissues, one of which is hard or *compact*, the other being porous or *cancellated*; while it is composed of one-third animal and two-thirds earthy matter, and is covered by a tough membrane called *periosteum*, and lined internally with a fine membrane called *endosteum*. Bone is the basis of the animal frame, or skeleton, giving attachment to the soft parts and shielding the delicate organs. For descriptive purposes bones are divided into three classes, as **long, flat, short** or **irregular**.

46. **Periosteum**—the outer covering of bone—is a dense fibro-vascular membrane consisting of two layers, an outer fibrous one and an inner one of fine connective tissue which is continued into the Haversian canals, by which means the bone is nourished. The **periosteum** varies in thickness according to the position of the bone, being thickest where the bone is most exposed to injury—for instance, on the **tibia** and **shank bone**.

47. **Endosteum** is a very fine vascular membrane lining the internal or medullary cavities of the bones, wherein the marrow (a fatty substance) is contained, and by its means the internal arteries are distributed through the internal parts of the bones. The

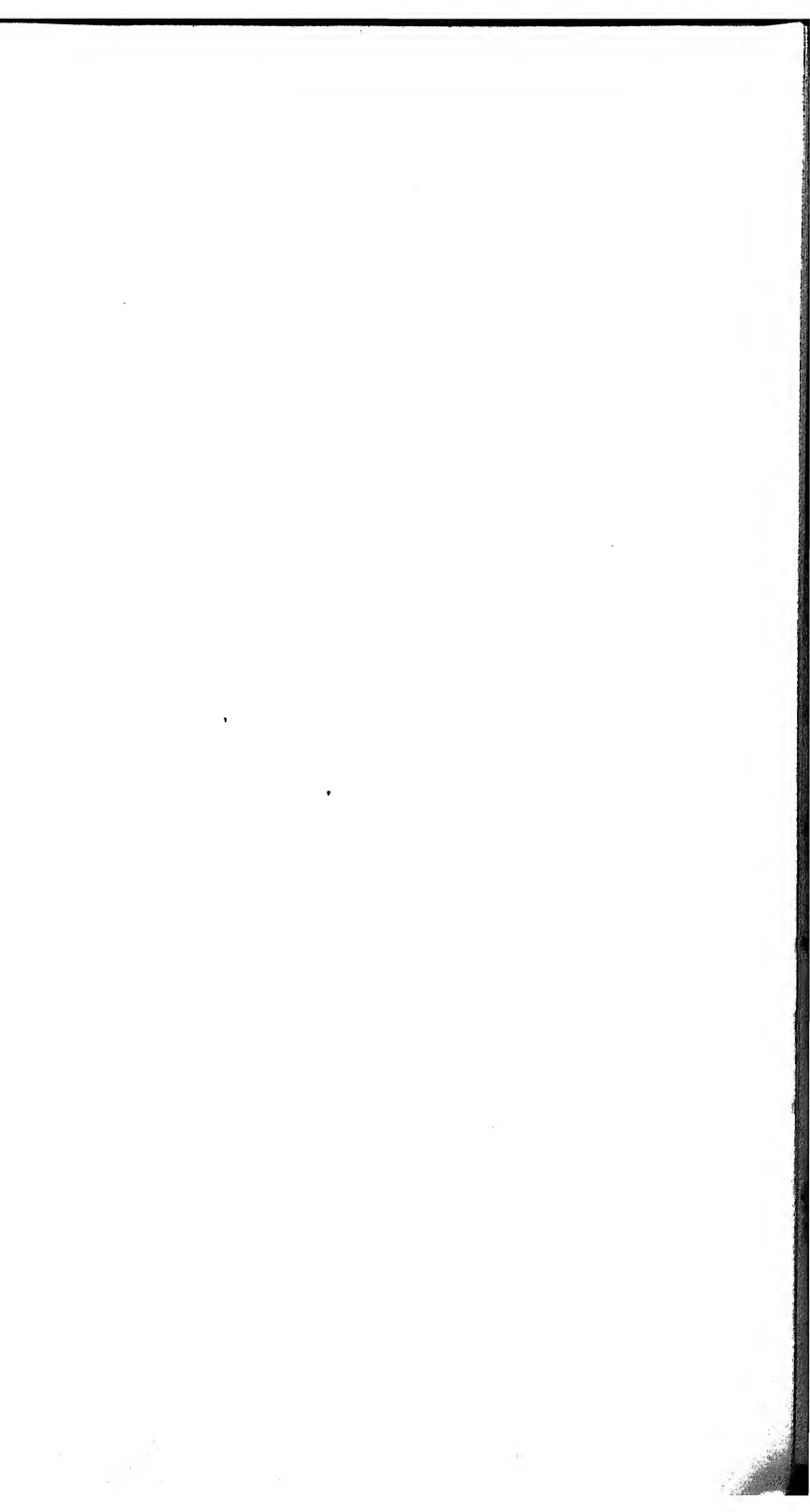
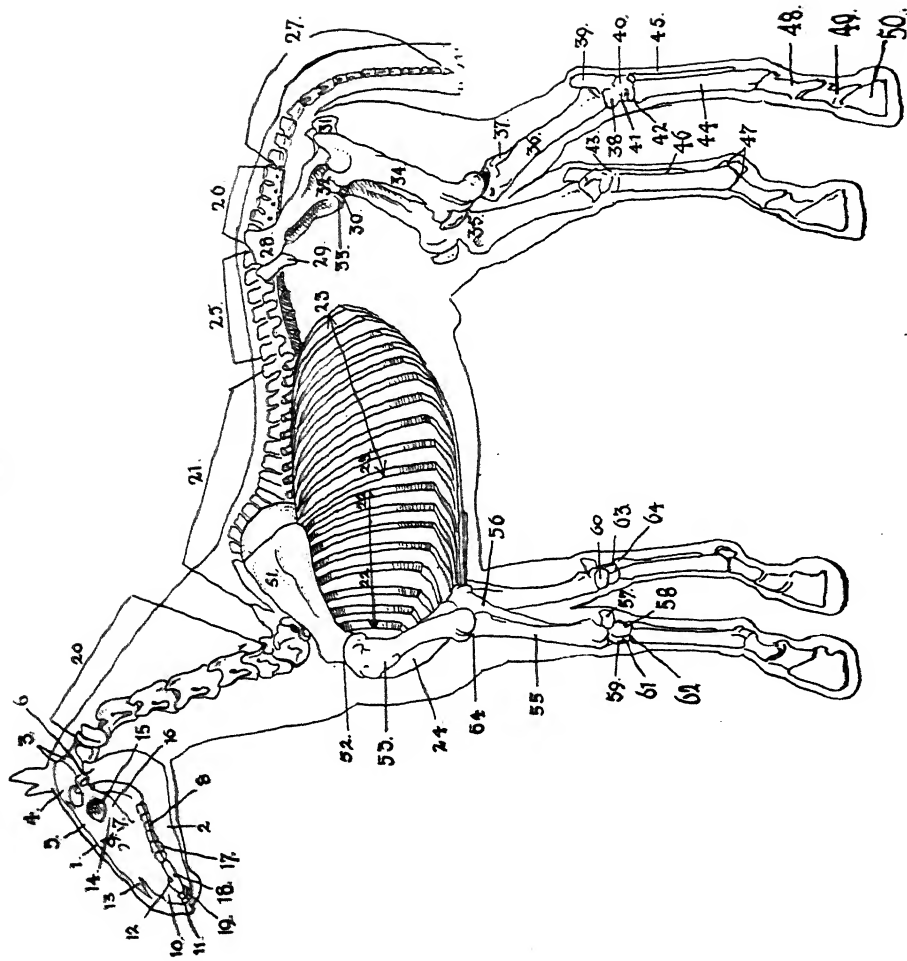


PLATE V



# EXPLANATION OF PLATE V

## THE SKELETON OF THE HORSE

- |  |   |                         |
|--|---|-------------------------|
| 1. Upper Jaw.  | 34. Upper Thigh Bone, or Femur.                                   |                         |
| 2. Lower or Under Jaw.   | 35. Stifle-Joint and Patella, or Knee<br>Pan.                     |                         |
| 3. Occipital Bone.   | 36. Tibia, Large Lower Thigh Bone.                                |                         |
| 4. Parietal Bone.  | 37. Fibia, or Small Lower Thigh Bone.                             |                         |
| 5. Frontal Bone.   | 38. Astragalus.   |                         |
| 6. Temporal Bone.  | 39. Calcis, or Heel<br>Bone.                                      | } Bones of the<br>Hock. |
| 7. Superior Maxillary Bone.  | 40. Cuboid Bone.  |                         |
| 8. The Upper Molars.   | 41. Large Scaphoid<br>Bone.                                       |                         |
| 9. Infra-Orbital Foramen.  | 42. Small Scaphoid<br>Bone.                                       |                         |
| 10. Pre-Maxillary Bone.  | 43. Cuneiform Bone.   |                         |
| 11. The Upper Incisors.  | 44. The Shank, or Large Metatarsal<br>Bone.                       |                         |
| 12. The Upper Canine Tooth or Tusk.  | 45. Outer or Splint Bone.   |                         |
| 13. Nasal Bone.  | 46. Inner Splint Bone.  |                         |
| 14. Lachrymal Bone.  | 47. Sesamoid Bones (2).   |                         |
| 15. Orbital Cavity.  | 48. Large Pastern Bone (Os Suffra-<br>ginis).                     |                         |
| 16. Zygomatic Bone.  | 49. Small Pastern Bone (Os Corona).                               |                         |
| 17. Inferior Molars.   | 50. Coffin Bone (Os Pedis).                                       |                         |
| 18. Inferior Canine Tooth.   | 51. Shoulder-Blade.   |                         |
| 19. Inferior Incisors.   | 52. Shoulder-Joint.   |                         |
| 20. The Cervical Vertebrae (7), the<br>first being the Atlas and the<br>second the Dentata or Axis.  | 53. Humerus— Upper Arm Bone, artic-<br>ulates at the elbow-joint. |                         |
| 21. The Dorsal Vertebrae (18).   | 54. Elbow joint.  |                         |
| 22. Eight True Ribs on the Breast Bone.  | 55. Fore-Arm, or Radius.  |                         |
| 23. Ten False Ribs.  | 56. Ulna.   |                         |
| 24. Breast Bone (Sternum).   | 57. Trapezium.  |                         |
| 25. Lumbar Vertebrae (6).  | 58. Cuneiform Bone.   | } Bones of the<br>Knee  |
| 26. Sacrum, which consist of five ver-<br>tebrae grown together, at the sides<br>of which are four openings through<br>which the sacral nerves pass. | 59. Lunar Bone.   |                         |
| 27. Coccygeal Vertebrae (20).  | 60. Unciform Bone.  |                         |
| 28. The Ilium.   | 61. Scaphoid Bone.  |                         |
| 29. The Iliac.   | 62. Os Magnum.  |                         |
| 30. Pubis.   | 63. Trapezoid Bone.   |                         |
| 31. Ischium.   | 64. Pea-shaped, or<br>Pisiform.                                   |                         |
| 32. Hip-Joint.   |   |                         |
| 33. The Hip-Joint downwards.   |   |                         |

Bones below the Knee same as below the Hock, except the Shank Bone which is called Metacarpal.

endosteum (unlike the periosteum) cannot be detached as a continuous membrane. In most birds, however, the medullary cavities of the long bones contain air.

48. **Long Bones** are the weight-bearers, and are found in the extremities or legs, and have a shaft and two ends. The compact or hard structure exists on the outside, being **thickest** at the middle and inner side of the shaft, or wherever most weight falls, there covering the cancellated or porous and light portions. The latter structure is most abundant at the ends of the bone, so as to give a large yet light surface for joints, and it is there further covered by articular cartilage.

49. **Flat Bones** are found where important organs have to be shielded. Thus, the bones of the head encase the **brain**; the shoulder-blade and ribs protect the heart and lungs, liver, etc.; while the hip or pelvic bones cover the organs of generation. Flat bones are made up of two layers of compact tissue, with a layer of cancellated or porous tissue in the middle.

50. **Short and Irregular Bones** are found in the backbone or vertebral column, knee, hock, and lower portions of the limbs. These bones are principally composed of cancellated tissue, covered with a thin layer of the compact or hard structure, and are so arranged as to bear weight, yet allow of movement, more particularly of a gliding nature, and an 'open-and-shut' motion.

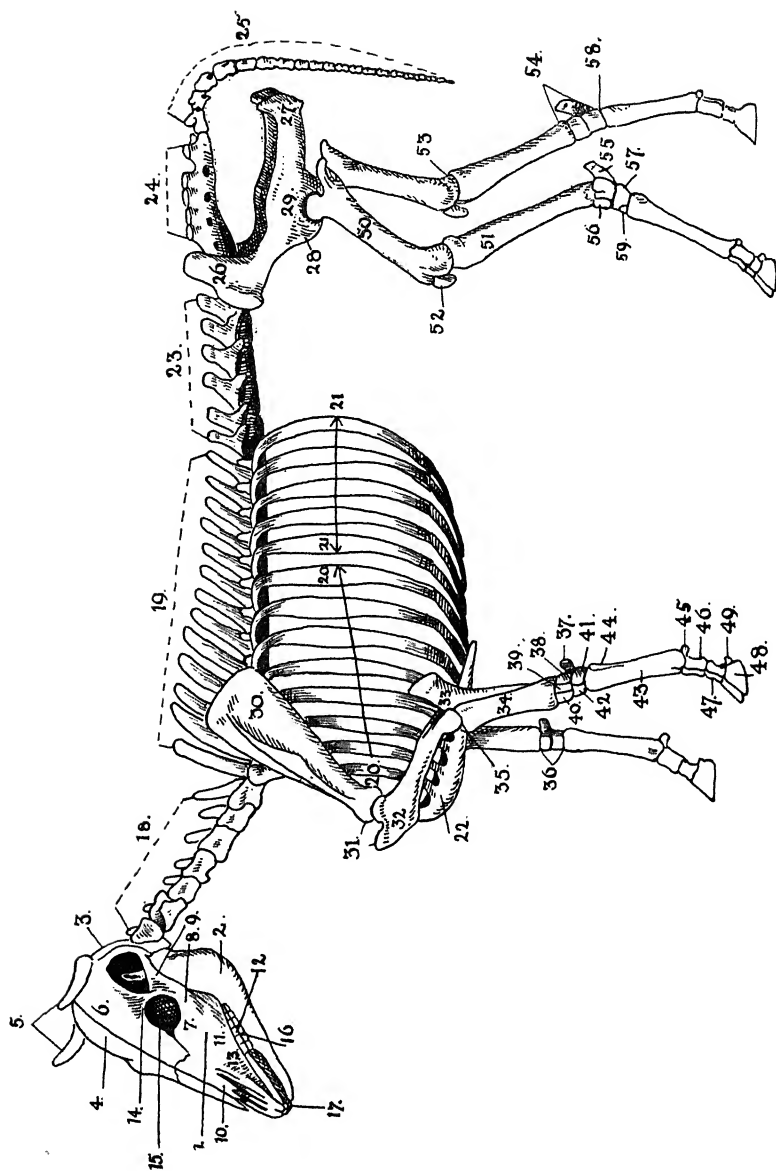
51. **The Skeleton** of the horse is said to be composed of about 253 bones (including the teeth), and is divided into **head, trunk, and extremities**. These divisions will, perhaps, be better understood by the following tables (*Plate V.*).

52. **The Head** is subdivided into **cranium** and **face**. The former consists of twenty separate bones, including four pairs and four small bones in each ear; while sixty-one bones are found in the face—nine pairs, three single, and forty teeth in the horse, and thirty-six in the mare.





# PLATE VI



## EXPLANATION OF PLATE VI

### THE SKELETON OF THE COW

- |  |   |
|--|---|
| 1. Upper Jaw.  | 30. Shoulder Bone.                              |
| 2. Lower or Under Jaw.   | 31. Point of Shoulder.                          |
| 3. Occipital Bone.   | 32. Upper Arm Bone.                             |
| 4. Frontal Protuberance.   | 33. Elbow Bone (Ulna).                          |
| 5. Horn Cores.   | 34. Forearm Bone, or Radius.                    |
| 6. Frontal Bone.   | 35. Elbow-Joint.                                |
| 7. Lachrymal Bone.   | 36. Fore Knee-Joint.                            |
| 8. Malar Bone.   | 37. Unciform Bone.                              |
| 9. Zygomatic Bone.   | 38. Polygonal Bone.                             |
| 10. Nasal Bone.  | 39. Lunar.                                      |
| 11. Great Maxillary Bone.  | 40. Scaphoid.                                   |
| 12. Six Upper Molars.  | 41. Semilunar Bone.                             |
| 13. Great Maxillary Bone.  | 42. Magnum.                                     |
| 14. Temporal Bone.   | 43. Metacarpal.                                 |
| 15. Orbital Cavity.  | 44. Rudimentary Metacarpal, or<br>Splint Bones. |
| 16. Six Lower Molars.  | 45. Sesamoid Bones                              |
| 17. Eight Incisors.  | 46. Pastern Bones.                              |
| 18. Seven Cervical Vertebrae, the<br>first bone being the Atlas. | 47. Coronet Bones.                              |
| 19. Thirteen Dorsal Vertebrae.                                   | 48. Hoof Bones.                                 |
| 20. Eight True Ribs.   | 49. Naicular Bones.                             |
| 21. Five False Ribs.   | 50. Thigh Bone (Femur).                         |
| 22. Sternum, or Breast Bone.                                     | 51. Tibia.                                      |
| 23. Six Lumbar Vertebrae.  | 52. Patella.                                    |
| 24. Sacrum.  | 53. Stifle-Joint.                               |
| 25. Eighteen to Twenty Coccygeal<br>Vertebrae.                   | 54. Hock.                                       |
| 26. Ilium.   | 55. Calcis (Heel Bone).                         |
| 27. Ischium.   | 56. Astragalus.                                 |
| 28. Os Pubis.  | 57. Scaphoid and Cuboid.                        |
| 29. Hip-Joint.   | 58. First Cuneiform Bone.                       |
|  | 59. The Second Cuneiform Bone.                  |

From the hock downwards the bones are the same as in the fore-limbs, except the Shank which is called Metatarsal.

## Bones of the Head.

### 53. Bones of the Cranium—

				Horse.	Ox.	Dog.	Pig.
Frontal (pair) ...	...	...	2	2	2	2	
Parietal (pair)	...	...	2	2	2	2	
Temporal (2 pairs, in horses only)	...	...	4	2	2	2	
Occipital	...	...	1	1	1	1	
Ethmoidal	...	...	1	1	1	1	
Sphenoidal	...	...	1	1	1	1	
Interparietal	...	...	1	1	1	0	

## 54. Bones of the Ear—

Malleus	}	(4 pairs)	...	8	8	8	8
Incus							
Stapes							
Orbicular							

## 55. Bones of the Face—

Nasal							
Superior maxillary	}	(9 pairs)	18	18	18	18	
Pre-maxillary							
Malar							
Lachrymal							
Palatine							
Pterygoid							
Superior turbinated							
Inferior	„						
Vomer ...	...	...	...	1	1	1	1
Lower jaw	...	...	...	1	1	1	1
Teeth ...	...	...	...	40	32	42	44
Os hyoides	}	bones of the	tongue	...	1	1	1
(7 or more sections)							

In the pig there is an additional single bone—the os rostri, or snout bone.

56. The Trunk is also divided into **spine, thorax, and pelvis.**

### Bones of the Trunk.

	Horse.	Ox.	Dog.	Pig.
Cervical (neck) ...	7	7	7	7
Dorsal (back) ...	18	13	13	14
Lumbar (loins) ...	6	6	7	7
Sacrum (croup) ...	5	5	3	4
Coccyx (tail) ...	13 to 18	20	20	18 to 22
Ribs (pairs) ...	{ 8 true 10 false	8 true	9 true	7 true
		5 false	4 false	7 false

57. The **Sternum**, or breast-bone, is in seven sections, and in the horse is placed edgeway up, while that of the cow lies flat.

58. The **Sacrum** in the horse, ox, and sheep is composed of five segments each; in the dog, three; and in the pig, four. The tail-bones are variable in different animals.

59. The **Ribs** of the ox are straighter, broader, and more uniform than those of the horse; they expand at their lower end, and the true ribs (excepting the first) articulate with their cartilages by true joints. The ox has also a small bone (sometimes two) in the heart, and the dog has one in the penis.

### Bones of the Extremities.

60. **Bones of the Fore-Legs (Right and Left)—**

	Horse.	Ox.	Dog.	Pig.
Scapula (shoulder-blade) ...	2	2	2	2
Humerus (upper arm) ...	2	2	2	2
Radius (forearm) ...	2	2	2	2

Bones of the Fore-Legs (Right and Left)—*continued.*

	Horse.	Ox.	Dog.	Pig.
Ulna (elbow-bone) { much larger in the ox than the horse }	2	2	2	2
Carpus (knee) ...	8 pairs	6 pairs	7 pairs	8 pairs
Upper Row—				
Scaphoid, lunar, cuneiform, pisi- form	(In the ox the trapezium is want- ing, and the magnum and tra- pezoid are represented by a single bone.)			
Lower row—				
Trapezium, trape- zoid, magnum, unciform				
Metacarpal ...	2 large	2 large	} See par. 61.	
" ...	4 small	2 small		
Sesamoids ...	4	8		
Os suffraginis (large pastern) ...	2	4		
Os coronæ (small ditto) ...	2	4		
Os pedis (coffin bone)	2	4		
Os navicular (shuttle ditto) ...	2	4		

61. The arrangement of the bones under the knee of the dog resembles that of the human hand. They number **thirty-four** in each limb, whilst those under the knee of the pig are about **twenty-eight** in each.

62. **Os Innominatum**, or pelvic (hip) bone, is composed of three sections—**ilium**, **ischium**, and **pubis** (right and left)—and these form the side, floor, and part of the roof of the pelvic cavity.

## 63. Bones of the Hind-Legs (Right and Left)—

			Horse.	Ox.
Femur (thigh bone)	...	...	2	2
Patella (stifle)	...	...	2	2
Tibia (leg)	...	...	2	2
Fibula (leg)	...	...	2	—
Tarsus (hock)	...	...	6 pairs	5 pairs
Astragalus, calcis, cuboid, sca- phoid, and two cuneiforms. }				
Large metatarsal	...	...	2	2
Small „	...	...	4	2

64. The pastern bones correspond with those of the fore extremities both in name and number. The bones above the hock are the same in the pig and dog; the hock, however, consists of seven pairs of bones in these animals, while each have twenty-nine pairs of bones under the hock. The skeleton of the **sheep** is analogous to that of the ox, both in number and names of bones (*Plate VI.*).

65. **Arthrology**, or study of the joints. The various bones of the body are held together by means of dense fibrous structures, called **ligaments**, to form **joints**, which are of three classes. In descriptive anatomy these are again subdivided, but the three primary classes only will be dealt with—viz.: **synarthrosis**—immovable, such as the union of the bones in the head; **amphiarthrosis**—slightly movable, as between the bones of the vertebræ; **diarthrosis**—movable in any direction, as in the hip, shoulder, knee, etc.

66. **Ligaments** are dense, fibrous, amber-coloured, flexible bands and capsular envelopes connecting ends of bones to form articulations, and are composed mainly of **white fibrous tissue**. Some ligaments, however, are mostly of **yellow elastic tissue**. The **ligamentum nuchæ**, which supports the head and neck, is V-shaped, and extends from the top of the shoulder, or withers, to the crown of the head, and consists of two layers or plates. Ligaments which hold the ends of bones together are termed capsular

and binding. The **capsular** ligaments are fibro-membranous bags or sacks, which envelop both ends of the bones, and are lined by a fine **synovial** membrane, which secretes the **synovia**, or **joint oil**, by which the articulation is lubricated. The **binding** ligaments are flattened or rounded bands running from the lower end of one bone to the top of the succeeding bone, and when present at the sides of the joint are called **lateral** ligaments; but when found between the ends of the bones in the joint they are called **interosseous**, and when they bind down tendons passing over the joints are named **annular** ligaments.

67. **Cartilage**, or gristle, is a pale bluish-white, firm, elastic, glistening substance, which is found adhering to the surface of bones, and forming parts of the skeleton, and is of two kinds—**temporary** and **permanent**. The **temporary** cartilage forms the original basis of bone, which in adult life becomes ossified. **Permanent** cartilage consists of two varieties—viz., **hyaline cartilage** and **fibro-cartilage**. And these again are named according to the purpose they serve, such as **articular**, when at the ends of bones to form joints; or **interarticular**, when it forms a pad in the middle of a joint, as between the bones of the vertebræ and in the stifle. We also have the **costal** cartilages, prolonging ribs anteriorly; the **cariniform** cartilage, keel-shaped, at the front of the sternum; the **ensiform** cartilage, heart-shaped, at the posterior end of the sternum; and the cartilage of **prolongation**, attached to the top of the scapula. **Lateral** cartilages are found on each side of the foot; and various cartilages form the basis of the **ear**, **larynx**, and **wind-pipe**. In short, cartilage is found giving shape and form where bone would not answer. Now, all these structures are liable to disease and injury, as well as the soft parts of the body.

68. **Bones** are subject to inflammation, more particularly so those of young animals, before they are matured. **Healthy bone** is **non-sensitive**, or very slightly so; but when bone is under inflammation, then, owing to its unyielding nature, the pain is very acute.

69. **Periostitis** is inflammation of the covering of the bone, and mostly occurs in young race-horses as **sore shins**. When the

inflammation is very acute and continuous, great constitutional disturbance is set up, the parts affected become swollen and very painful to the touch, and if not speedily relieved the disease may terminate in death of the bone (necrosis) or the death of the patient. Although *periostitis* is generally the result of some injury done to the bone or its covering (*periosteum*), it may also arise from constitutional disturbance, such as rheumatism (*rheumatoid periostitis*), causing acute pain to the animal, accompanied by a great loss of flesh.

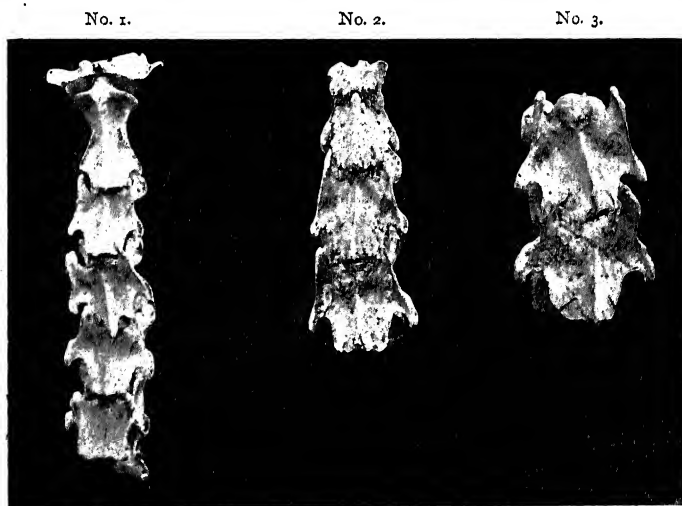


FIG. 1.

The photo shows—No. 1, healthy bones of the neck (*cervical vertebrae*); Nos. 2 and 3, caries or ulceration of the periosteum of the same bones, with ankylosis, or the growing together of the joints.

70. **Treatment.**—Rest is the first essential. Some practitioners recommend the use of hot fomentations, or bandages wrung out of hot water. For my part, I like cold-water applications best, or **spongiopiline**, soaked in cold water, and secured over the affected part with a bandage. For combating the fever, I find saline fever medicines answer best (*par. 1067, No. II.*). Sometimes the parts affected have to be cut down upon to liberate the exudate under



the periosteum. At times a good plaster bandage has a grand effect.

71. **Ostitis** is inflammation of the bone, and may be due to an injury, or may arise from constitutional or hereditary causes—tubercular or scrofulous, or from other diseases, such as attacks of rheumatism. Sometimes a very slight injury may set up inflammation of the bone, and cause bony material or exudate to be thrown out, forming bony enlargements, such as **splint**, **ringbone**, and **spavin**. These deposits are known as **exostosis** or **osteoma**, and our endeavour should be to find out the exact place affected, and apply such remedies as will hurry on the inflammation to resolution and consolidation, and thus form a true bony deposit. For treatment, nothing beats the application of cold water. When there is no water-main, such as is found in most towns, this treatment can be accomplished by elevating a large cask or tub filled with water, and connecting with it one end of a piece of  $\frac{1}{2}$ -inch indiarubber piping, 10 or 12 or more feet long, the other end of which is secured over the parts affected or to the horse's limb by a bandage or other appliance, and when this is fastened to the part requiring irrigation, it secures a constant stream of water on the syphon principle—**tub and tube irrigation**. When the inflammation has abated, a smart blister may be applied, or, where applicable, the plaster bandage may be used.

72. **Caries or Ulceration** of the bone is a molecular death of a portion of the bony structure, which has a worm-eaten appearance. There is no bone in the body that is not subject to this affliction, but it affects some bones more commonly than others. The pain is continuous, and wears the animal down. The strength must be supported with good nutritious diet, while cold applications should at first be resorted to, followed by blisters, firing, punching, and, when practicable, cutting down on the part and scraping with a bone spoon, thus endeavouring to bring about healthy action. These latter operations should be in the hands of a professional man. If the disease is near to or in connexion with a joint, the object should be, if the animal is likely to be of any service afterwards, to hasten

on the inflammatory process to throw out healthy bony material sufficient to unite the ends of the bones and form a stiff joint.

73. **Anchylosis**, the abnormal consolidation and immobility of a joint. In this case the articular cartilage becomes absorbed or destroyed, and a bony deposit takes its place in and around the damaged joint, the two bones becoming united. Sometimes the disease continues, and breaks out, forming **sinuses**, which discharge a fetid, irritative matter, and are extremely difficult to deal with, requiring an operation and antiseptic treatment. Generous diet is highly necessary. Old horses are very subject to anchylosis from hard work or rheumatic affection, particularly in the back bones. Great care is therefore necessary in casting these. The knee, hock, fetlock, and pastern joints also on many occasions become fixed, and the flexibility of the limb is interfered with; but slow work, particularly that on the farm, can be done without pain to the animal, although what may be called mechanical lameness might be present. Anchylosis may, however, arise from other causes, and the joint become fixed.

74. **Necrosis**, or death of the bone, resembles mortification in the soft structures. When inflammation of bone is very intense, it may at times terminate in death of the affected part. The hard or compact structure is said to suffer most from necrosis, and when the dead bone is encased in the healthy structure it acts as an irritant, and causes a fetid discharge. I have seen it in the lower jaw, incited by the rough usage of the horse-breaker, where the dead portion, as soon as it became loose enough, was removed, and the part healed. I have removed half of the navicular bone and wing of the coffin bone, also a portion of the shank (metatarsal) bone with success. Immediately the dead portion is removed the discharge ceases, and the place soon heals up. It must be dressed with antiseptics (and nothing is better than a weak solution of hydrochloric acid) and interfered with as little as possible, in order to let it mend. At times the dead portion cannot be got at to remove, and it then becomes sequestered by healthy bony matter being thrown out, and enveloping the dead portion; but this is a long process.

75. **Rickets** is a peculiar softening and yielding condition of the bone, and may be looked upon as arising from the imperfect assimilation of the lime elements through a want of earthy salts, or an excess of animal matter, by the bony structure, so that the bones will scarcely support the weight of the body. Rickets is mostly seen in young dogs and pigs, and not so frequently in foals and calves. In the treatment of rickets the affected animal should be put into a well-drained and ventilated box, and provided with a good comfortable bed. Should any constitutional disturbance be present, it ought to be combated by giving fever medicines, followed up with tonics; and, as such, nothing is better than the **syrup of phosphates of iron, potash, soda, and lime**, and **glycerine or cod-liver oil**, given in doses of 1 tablespoonful twice a day in milk. Good, well-boiled oatmeal porridge with plenty of milk and a wine-glassful of lime-water night and morning is also recommended.

76. **Mollities Ossium (osteo-malacia)** is real softening of the bone, which becomes of a spongy red texture; the treatment is much the same as for rickets. Another disease of the bone, which is thoroughly described in Williams' 'Principles and Practice of Veterinary Surgery,' is called **osteo-porosis**, and is a remarkable softening and swelling of the bony structure. I have not, however, in all my practice come across such a case.

77. **Fragilitas Ossium**, or brittleness of the bone, is mostly seen in aged animals; as they advance in life the bones become firmer, and lose their animal matter to a certain extent—so much so that the bones of an old horse, owing to their fragile condition, are very subject to fracture.

78. **Osteo-Sarcoma** is a malignant disease of the bone of a cancerous nature, which at times implicates the flesh as well. It is very common in finely-bred cattle and horses, attacking generally the head, and frequently commencing in the inner corner of the eye; the ribs are also the seat of the disease. It creeps on very insidiously, producing little or no constitutional disturbance. The animal seems to have no pain, but gradually loses flesh. I have seen cases where the whole side of the upper jaw, including the eye-socket and upper

molar teeth, was so affected that I have removed the latter with my fingers and scraped off the diseased growth; yet, although the bleeding was excessive, the animal seemed to feel no pain. I have also seen the under jaw in a similar condition to that of the upper. The first appearance of the disease is a large swelling, which finally breaks out with a dirty brown discharge and a rapid growth of spongy-looking flesh. As little or no good can be done the animal had better be destroyed. This disease may be, and often is, mistaken for actinomycosis, which it very much resembles.

79. **Scrofulous or Tubercular** disease of the bone is due to the deposition of tubercular material in various parts of the bony structure. A number of cases in cows have come under my notice where the tubercular deposit has been found in various parts of the spine, causing a peculiar staggering gait, and the animal finally loses the power of the hind legs even when the tubercle has been found in the neck bones. It follows certain strains of blood; the animal suffering will continue to live on, feed, and chew the cud, but finally it gets so bad that it cannot get up, and has to be rolled from side to side every five or six hours. The stifle, knee, and other joints suffer very much from this disease, treatment as a rule being of little use. The best remedy I have found is the injection of a dose of tuberculin under the skin at the breast once a month; this has at times a beneficial action, and arrests the progress of the disease.

80. **Enchondroma** is a cartilaginous growth or tumour upon a bone, such as the sternum and ribs, seldom causing, however, any constitutional disturbance; when practicable this has to be removed by a surgical operation.

81. **Fractures.**—What is a fracture? Some define it as a solution of continuity, which, I think, is not a good description. My definition of a fracture is: 'A forcible separation of the cohesive particles of a hard substance into two or more parts.' Now, the bones of an animal are as liable to fracture as those of the human subject. Formerly it was thought that the bones of a horse would not mend; yet this is not so, for they will unite more quickly than those of the human frame, but we cannot place the patient in the

same state of rest and quietness, hence the difficulty in getting recoveries. With flat bones, as the shoulder-blade and pelvic bones, where they are enveloped with flesh, the ends of the bones are kept fairly well in apposition, and at times do capitally, simply by putting the animal on to the slings, with perfect quietness, and with a good pitch charge applied over the affected parts. The bones of the pastern joints, when the injury is not too extensive, also occasionally do well, and where the animal is likely to be useful for stud purposes it is worth the attempt. The best recoveries in fractures of the lower bones of the limbs are obtained by putting on a good starch or plaster-of-Paris bandage—the latter is preferable—and turning the patient out to grass. It is astonishing, when the animal is left to itself, how soon it can nurse the maimed limb. Fractures of the long bones or weight-carriers, such as the thigh, forearm, and shank, are the most difficult to deal with, especially in the horse, which, if so injured, is generally destroyed; yet in the human being these are the best to treat. The long bones of cattle and dogs unite readily by putting on with melted burgundy pitch thick shoe-sole leather splints,  $1\frac{1}{2}$  inches broad, all being held with a bandage, which is not too tight, so as to allow of the swelling which takes place. When a bone is fractured, we sometimes have much constitutional disturbance or traumatic fever set up, and this has to be treated as well as the injured part (*par. 38*). Great care and judgment are required in putting splints and bandages on a broken limb. Splints made of stout shoe-sole leather are very useful, placed so as to leave room between the splints for the limb to swell and for the passage of the blood. A little melted burgundy pitch put on the splint before placing it on the limb keeps it in its place. The bandages as they are rolled on are smeared with the melted pitch, and must not be pulled too tight, especially in young foals.

82. **Callus**, a deposition of bony material. Before a fracture can unite, inflammation has to take place, and reparative material or bony exudate is thrown out between and around the broken ends of the bone, taking about six or eight weeks to become consolidated, and which on solidifying is called the callus. A great many weeks are required before the muscles of the affected limb regain their

action. Sometimes, instead of the ends of the bones uniting, they become covered with cartilage, and form what is termed a false joint; when this is the case it is best to have the animal destroyed.

83. **Fractures** are of six kinds, viz.:

- |                         |                 |
|-------------------------|-----------------|
| 1. Simple.              | 4. Complicated. |
| 2. Compound.            | 5. Green Stick. |
| 3. Compound Comminuted. | 6. Impacted.    |

84. **Simple Fracture** is when the bone is simply broken without much injury to the flesh—a fracture only into two parts, and without any external wound.

85. **Compound Fracture** is where the bone has been broken in an oblique manner, and the sharp ends, pointing up and down, cut through the flesh and skin, and make an external wound. In the horse this is difficult to deal with, and the most humane course is to have the animal destroyed.

86. **Compound Comminuted Fracture** is where the bone is broken or crushed into a great many pieces and the connecting tissues implicated. Little or no good can be done in these cases.

87. **Complicated Fractures** are where the fracture extends into a joint, or wounds important organs, bloodvessels, etc.

88. **Green Stick Fracture** is a partial or deferred fracture, where only part of the bone is partially broken (cracked). It is an incomplete fracture, in which one portion is broken, while the other holds together.

89. **Impacted Fracture** is the jamming or driving in of one fragment of bone into the other, without movement or crepitation.

90. All the bones of the body are subject to fractures. When we had the old horse-thrashing machines, injuries to the bones of the head were not uncommon. In pit horses, too, I have seen the frontal and nasal bones derved in, and occasionally had to use the trephine to remove a piece of bone so as to get into the cavities and liberate the collected blood or effusion. The lower jaw also some-

times gets broken; but all such cases require the attention of the qualified practitioner.

91. **Occipital Bone**, at the back part of the head, is often fractured by the horse falling back, and so is the **atlas**, or first cervical vertebra. The injuries are generally followed by paralysis, and the animal has to be destroyed.

92. **Cervical Vertebrae**.—The oblique processes of these bones are now and again fractured, mainly by the horse getting a hind-foot shoe fixed in the head-collar on scratching its head. When this takes place, the head turns round to one side, the nose nearly touching the knee, and there is all the appearance of some of the neck bones being dislocated. The head, when this occurs, should be tied up short to the rack with a double-shanked halter, and the part, supported by a stout pitch plaster, with wooden splints, and cradle, put round the neck. The bones of the neck also occasionally get smashed by the horse falling on its head. One case in particular deserves mention: Lord of the Harem, when racing at Harras Moor, Whitehaven, some years ago, fell and broke the third and fourth neck bones. After falling, strange to say, *it got up and walked a quarter of a mile to a loose-box*; but immediately it got inside it laid down, and never got up again. I saw it next day, in company with two other professional men, when we ordered it to be destroyed, as there was no mistake about its neck being broken. Greyhounds also frequently come to grief in this fashion when coursing.

93. **Broken Back**.—When this happens, the animal may rise on to its fore-legs, but cannot get the hind ones up. To test it, stick a pin into the hind limbs, and if it shows pain and can pull its legs up to its belly, or kick out, there is some chance for the patient; but if no pain is evinced the case is hopeless.

94. **Haunch Hook**, or hip-bone, is frequently broken or chipped, and should be noticed particularly, specially when examining for soundness. It may be caused by the horse tumbling down or by going through a doorway, but it does not hinder the horse from doing its work. The piece broken off may drop into the flesh below,

but very rarely it brings on bad effects. Sometimes, however, it forms an abscess, which has to be cut down upon, and the piece or pieces of detached bone removed. This lesion is of more frequent occurrence in cattle than in horses.

95. **Ilium.**—When the shaft of this bone is broken, the horse has a peculiar way of walking; on putting one hand on the point of the haunch and the other on the rump bone, and getting some one to stir the leg, you will both hear and feel the ends of the bones crunching underneath. Long rest and support with pitch charges are required.

96. **Pelvic Bones.**—I have seen the floor (**symphysis pubis**) of the pelvic cavity fractured by a fall down a stone quarry, and when the animal (a cow) attempted to stand the legs spread apart. It was put in slings, had its hocks buckled together, and made a good recovery in about seven or eight weeks. Horses should also be put into slings, and have the legs tied together at the hocks. When such an accident happens to a fat cow or ox, it should be sent to the butcher.

97. **Ischium**, or rump bone, is now and again fractured in the horse. This may be caused by the animal falling over backwards, and occurs more particularly in a young horse, when first tied up, breaking its halter and rearing, or from a slip when backing. It is not of much consequence; only the side injured is more flattened than the undamaged one. This should be carefully noticed in examination for soundness. It is best seen by viewing the animal sideways.

98. **Femur** is at times fractured at the top or neck, and also in the shaft. It may be due to a fall, or it may occur when a horse has been cast and tied for some operation, as in castrating. On account of the quantity of flesh surrounding the bone, little or nothing can be done; the animal has to be destroyed. I remember one case—a valuable carriage horse—where the inner condyle of the lower articulation of the femur was broken off, and the **patella**, or cap of the stifle, was split at the same time; it was a compound comminuted fracture. The horse was put into slings, but its sufferings were so great that it was shot.



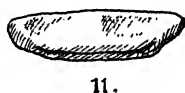
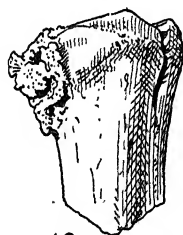
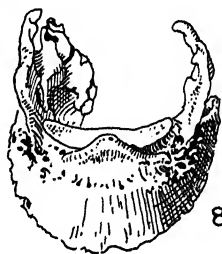
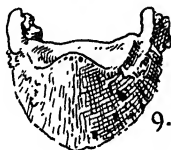
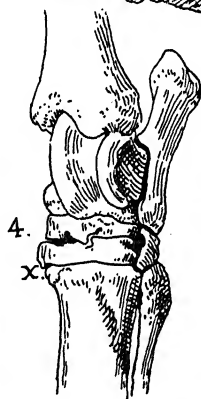
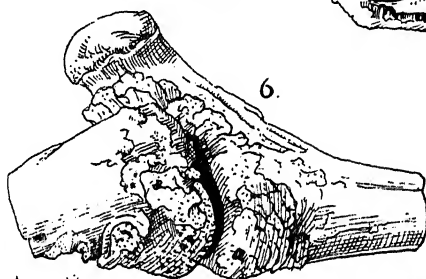
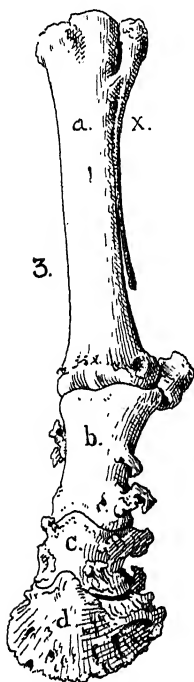
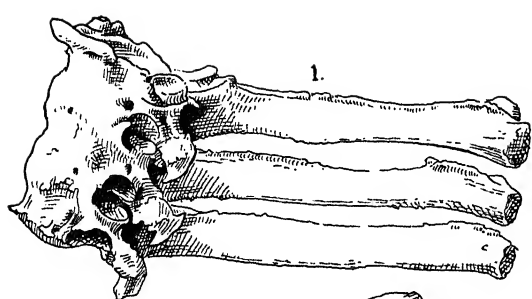
99. **Tibia**, or leg-bone, is considered to be more liable to fracture than any other bone in the body, but very often the bone is merely cracked without any displacement, and with little or no lameness present. A slight skin wound may perhaps be seen, or, maybe, only a small enlargement felt, which is painful to the touch.

100. **Cracked Tibia**, or deferred fracture, mostly occurs when two horses are put into one stall, and one of them, standing a little further forward than the other, kicks out and hits its companion on the inside of the thigh. The best thing that can be done in a case of this kind is to at once tie the injured horse up by the head with two halters, one on each side, and put on the slings, not permitting it to lie down, as the limb frequently gives way when the animal gets up. But if it is kept working for two or three days (which it may be equal to), the least exertion will cause the bone to part asunder. Hence, if there is a doubt whether the horse's leg be cracked or not, give the animal the benefit of the doubt, and tie it up for a time. In one case under my notice the horse stood for three weeks, but when turned out to grass it laid down to roll, and on rising broke the bone in two. In the case of a blow on the inside of the fore-leg—the **radius**—there is the same danger, and similar treatment must be adopted.

101. **Scapula**, or **Shoulder-Blade**, may be broken by excessive muscular contraction, owing to the lower parts of the limb—particularly the foot—being suddenly injured. It may also be damaged by the animal falling, through making too sharp a turn when galloping. If the fracture be oblique, and the horse is put in slings, the parts being well supported with a good pitch charge, a good recovery may result; but if the neck of the bone be broken, and the joint be implicated, treatment is of little avail.

102. **Humerus** can be fractured by the animal falling in its gallop, or by a kick from another horse. Recovery entirely depends on the nature of the injury. Treatment is the same as for the shoulder-blade.

# PLATE VII



## EXPLANATION OF PLATE VII

### BONE DISEASES

1. Anchylosis of the Back Bone, showing Three Bones fused together.
2. Anchylosis of the Pastern Bone, with Caries and High Ring Bone.
3. Shank Bone (a), Long Pastern (b), and Short Pastern (c), and Coffin or Pedal Bone (d), showing Bony Deposits, with Ulceration; (x) Seat of Splint.
4. Left Hock-Joint. (x) Seat of Bone Spavin.
5. Occult Bone Spavin, showing Three Bones united together (the Two Cuneiform Bones and the Scaphoid), as a Result of Inflammation and Bony Deposit.
6. Ulceration or Caries of the Elbow-Joint of a Horse.
7. Coffin Bone, with Lateral Cartilage ossified and enlarged as Side Bones.
8. Bad Caries, Side Bones.
9. Normal Coffin or Pedal Bone.
10. Knee Spavin with Caries.
11. Sound Navicular Bone.
12. Navicular Bone: Dark Spots indicate Ulceration of Bone, as in Navicular Disease.

103. **Ulna.**—The upper and posterior portion of this bone forms the **elbow**, the point of which is occasionally fractured by a kick or from a fall. When this happens, the limb hangs down (dropped elbow) and the knee-joint bends forward as if all the muscles between the back of the shoulder-blade and the elbow-point were torn asunder, and recovery is very uncertain. Fracture of the first rib shows similar symptoms.

104. **Radius, or Forearm, and the Cannon or Shank Bones** of the fore and hind legs in the horse are most subject to fractures, and are very difficult to treat, owing to the limb having to hang pendulous. There is great pain, and the parts swell, generally ending with mortification of the soft structures and death of the patient. The most humane treatment, therefore, is to destroy the animal at the outset. These bones in cattle, sheep, and dogs, however, generally do well when splints and bandages, as already named, have been properly applied.

105. **Knee-Joint.**—Some of the small bones of this joint are at times fractured by the animal being kicked, or by its coming in contact with a stone wall, etc. Splints and bandages should be applied and long rest given, but the result is invariably a stiff joint.

106. **Sesamoids, or fulcrum bones, at the back of the fetlock,** are occasionally fractured; when this occurs the fetlock descends and the toe sticks up. The **os suffraginis**, or *large pastern bone*, in the fore-leg, seems generally to be the most subject to fracture, being at times broken into a number of pieces. The same thing occurs to the **os coronæ**, or *small pastern*. Such cases, when the bone is not too much smashed, make good recoveries when put under treatment, but leave behind stiff joints. The **os pedis**, or *coffin bone*, as well as the **navicular bone**, are also occasionally fractured. These fractures are generally caused by the horse galloping on a hard road, or on rough, uneven ground, or on hard sand. (For bones mentioned in *pars. 91 to 106* reference should be made to *Plates V., VI., and VII.*)

## SPECIAL DISEASES OF THE BONE.

107. **Splint** is a bony enlargement, and is usually found on the inside of the fore-leg, just below the knee, though occasionally seen on the outside, and also, but rarely, on the hind shanks. It is due to an injury or concussion, setting up inflammation of the bone and periosteum, and resulting in the throwing out of bony matter forming an **exostosis**, or bony tumour. Young horses of the light class are most subject to it, chiefly through their being put to too fast and

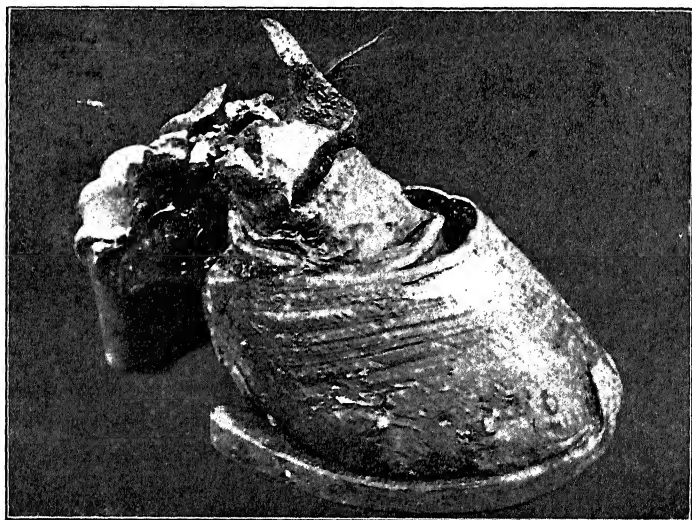


FIG. 2.—FRACTURED LONG PASTER (OS SUFFRAGINIS) INTO THIRTY-FOUR PIECES (*par. 106*).

heavy work on hard roads before their bones are properly set, some breeds being more prone to it than others. When formed on the large shank bone, and well forward towards the front of the bone, although the splint may be of large size and unsightly, it seldom causes any lameness, and is not nearly of so much consequence as when inflammation takes place at certain points of attachment between the large shank and inner small splint bone, along with the exudation of bony material implicating the **interosseous ligament**,

which either becomes absorbed or **ossified**, and the union of the two bones takes place with or without enlargement (*Plate VII., Fig. 3, x*). This may be termed *true splint*, and in many cases causes a very troublesome and protracted lameness. If care and rest, with suitable treatment, be not early adopted, the inflammation and bone formation may extend behind and under the suspensory ligament to the outer splint bone. At its commencement this class of splint is not easily detected, as there is nothing to be seen or felt, only a peculiar lameness, with a characteristic nodding and dropping of the head, *noticeable both on hard and soft ground* when the horse is trotted, while little or no lameness is observed in the walk. On pressing the finger firmly between the large and small bones on the inside, below the knee, the animal shows pain, and may rear up, owing to the sharp twinge produced by the pressure on the inflamed structure.

108. **Treatment** for splint is to give rest, with cold water applications, until the inflammation subsides; then blister and blister, and, if necessary, follow up with the plaster bandage or firing, setoning, etc. Occasionally great benefit is derived from cutting through the skin and dividing the periosteum with a suitable knife. Should the bony deposit become **carious**—worm-eaten—as it sometimes does, cutting down on the part and scraping with a bone spoon may have good effect. The great point in the treatment is to hurry on the inflammatory process to the deposition of healthy bony material, and for this purpose nothing beats the hot iron prongs.

109. **Sore Shins.** See Periostitis, *par.* 69.

110. **Ring Bone** is due to inflammation of the bony structures and deposition of bony material, with enlargement, varying in size. It is found on the large and small **pastern bones**, and may be due to an injury, such as a nip in casting a young colt and tying too tight with a hard rope, or from constitutional causes, such as rheumatic and other hereditary tendencies. It may be considered under two heads—High and Low. **Low ring bone** is seen just above the top of the hoof, and is generally largest at the sides, while **high ring bone** is found a little higher up. Both forms, when not early and properly attended to, may end in **caries** and **anchy-**

**losis** of the upper and lower pastern bones (*Plate VII., Fig. 2*) or of the lower and coffin bone. Ring bone occurs more frequently in the light-legged horses and half-breeds, also more often in the hind pastern than the fore, and is accompanied by stiffness and lameness, but the pain and enlargement of the parts are the most pronounced symptoms.

**111. Treatment** of ring bone is mainly unsatisfactory. Give rest, and try to arrest the progress of the inflammation and prevent the deposition of bony matter; and for this there is nothing better than a bandage of meadow hay rolled up nicely and put round the leg (but not too tightly), and kept constantly soaked with cold water until the inflammation is reduced. Follow this up with blisters and firing, the hot prongs preferred, assisted by the application of a shoe suitable to the case, according to the form of lameness and parts affected.

**112. Side Bone and Navicular Disease.**—These are fully explained under Lecture IV., on 'The Horse's Foot—Shoeing, etc.' (*pars. 192 and 199*).

**113. Stifle Joint Disease.**—This joint, which corresponds to the knee of man, being a double joint, is, more particularly in an old horse, subject to extensive disease of the bone from hereditary and rheumatic causes (*Plate IX., No. 30*). The bone becomes **carious** (worm-eaten), the cartilages are absorbed, and a porcellaneous deposit takes place between the ends of the bones. Treatment is of very little use. At the outset rest and cold water applications, followed by blistering, firing, and setoning, may have a beneficial effect, or a charge may be applied (*par. 1061*).

**114. Bone Spavin.**—A bony enlargement due to inflammation of the head of the metatarsal or shank bone and the cuneiform bones, with a deposition of bony material, which at times forms an exostosis, or bony enlargement, at the lower, inner part, and partially to the front, of the hock joint of the horse (*Plate IX., No. 34*), and which in many cases causes great pain and lameness and a form of unsoundness. It is brought on by injury or overexertion,

as in jumping, more particularly in young horses when not trained or in condition. The pain frequently is so acute that the animal, when first brought out of the stable, dare scarcely put its foot to the ground, and then, if it does, only on the toe; yet, after going a short distance, the lameness gradually disappears, and the animal goes sound; the lameness, however, returns again after a short rest. The toe of the shoe of a spavined horse, it will be noticed, is generally well worn. Bone spavin is not always easily diagnosed, more particularly when the joints are weedy and dissimilar, and there is an absence of lameness, which is of frequent occurrence in half-bred horses. This causes great difference of opinion to occur amongst members of the profession—spavin or no spavin—more particularly so in case of **occult spavin**, when three or four small bones of the hock become united to such an extent that the original divisions are not distinguishable, there being little or no enlargement outside the bone (*Plate VII., Fig. 5*). These cases are difficult to detect, as little or nothing can be seen or felt outside. A decision, therefore, can only be arrived at by judging the movement of the joint, which, in such cases, is generally carried stiffly, with a roundabout action of the toe inwards. In cases of doubt, lift the foot, take hold of the toe, and press the front of the fetlock against the stifle joint for two or three minutes, then make the animal trot; if it goes very lame, and only puts the toe to the ground, the lameness gradually disappearing with the exercise, it may be concluded that spavin is developing. In some cases a bone spavin may be patent both to the eye and touch, and yet the horse goes sound and does his work correctly. To detect bone spavin, stand about one foot sideways from the animal's shoulder, and look diagonally across the lower and inner part of the hock joint, and compare the joints. When the inflammation is extensive, it may terminate in **caries** or **ulceration**, as when two or more of the bones of the joint become involved; this, as a rule, may be looked upon as incurable, thus showing how necessary it is that *entire rest and careful treatment should be early adopted*.

115. **Treatment** of bone spavin is the same as that laid down for splint and ring bone (*pars. 108 and 111*); but if there is one



thing more than another that firing has a decided benefit upon it is bone spavin, as it hurries the inflammatory action forward to a healthy termination. It must be borne in mind that when we have any extensive accidents or disease of the bones and joints, the muscles surrounding or above the injury waste away, and take a long time before they resume their proper standard and tone.

116. In connexion with the diseases of the bones, special attention may be given to *Plate VII.*, and the text explanatory of the different figures, particularly to the ankylosis of the three bones of the spinal column, or back bone; also the **ring bone**, the bones of the hock, and **occult spavin**; while the mark x on *Fig. 3* shows the point of **true splint**, and *Fig. 6* caries of the elbow-joint. *Figs. 7 and 8* are good specimens of **side bones**, or ossification of the lateral cartilages of the foot.

### LECTURE III

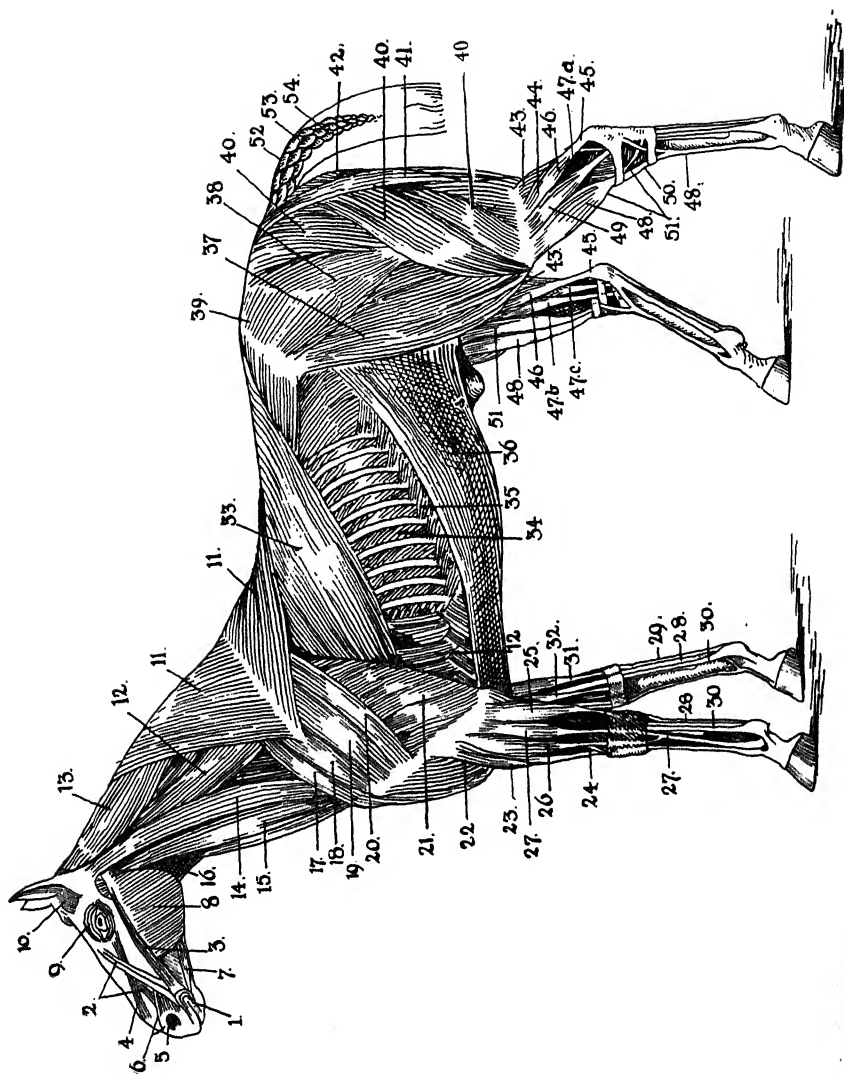
## MYOLOGY, OR THE STUDY OF THE MUSCULAR SYSTEM

117. **Muscle**, or flesh, is a contractile, fibrous structure, and forms the bulk and symmetry of the body. It is composed of bundles of small fibres held together by connective tissue, and is in intimate connexion with the bony structures. Muscles are the active organs of locomotion, and are also found entering into the formation of the walls of various organs of the body, as the stomach, bladder, etc. There are two kinds of muscles—**striped** or **voluntary**, and **non-striped** or **involuntary**. The voluntary muscles are under the control of the will—as, for example, those of the legs, etc.—while the involuntary muscles carry on the functions of the body independently of the will, as those of the intestines, uterus blood-vessels, etc. The muscle of the heart, however, though involuntary, is striped.

118. A **Voluntary** muscle may be said to consist of three parts: First, the tendinous origin—*i.e.*, where it arises; second, the body, or fleshy part—the contractile portion, or tissue, which does all the work, producing the movements of the body; and third, the termination in the pale yellowish-white glistening bands, or fibrous cords, called **tendons**, or sinews, which are extremely strong, though very light. These latter are inserted into the various portions of the bony structure, which are to be acted upon in locomotion, and thus attach the muscle to the bone.

119. Muscles, like bones, have particular names, according to their situation, form, attachment, and action, and they are well

PLATE VIII



## EXPLANATION OF PLATE VIII

### THE MUSCLES OF A HORSE

1. Circular Muscle of the Lips.
2. Elevator of the Upper Lip and Wing of the Nostril.
3. Zygomaticus.
4. Proper Elevator of the Upper Lip.
5. Transverse Muscle of the Nose.
6. Pyramidal Muscle of the Nose.
7. Depressor Muscle of the Under Lip.
8. Masticator Muscle.
9. Circular Muscle of the Eyelids.
10. Temporalis Muscle.
11. Trapezius.
12. Cervical Portion of the Serratus Magnus, the Chest Division being behind the Shoulder.
13. Splenius.
14. Mastoido-Humeralis, or Levator-Humeri.
15. Sterno-Maxillaris.
16. Scapulo-Hyoides (the upper part is alone visible).
17. Pectoralis Parvus.
18. Antea Spinatus.
19. Postea Spinatus.
20. Teres Externus, or Long Abductor of the Arm.
21. Triceps Extensor Brachii.
22. Coraco-Brachialis.
23. Extensor Metacarpi Magnus.
24. Extensor Metacarpi Obliquus.
25. External Flexor of the Metacarpus.
26. Anterior Extensor of the Phalanges.
27. Extensor Suffraginis.
28. Flexor Perforans and its Tendon.
29. Flexor Perforatus and its Tendon.
30. Suspensory Ligament of the Fetlock.
31. Oblique Flexor of the Metacarpus.
32. Internal Flexor of the Metacarpus.
33. Latissimus Dorsi.
34. Intercostal Muscles.
35. Obliquus Abdominis Externus.
36. Rectus Abdominis.
37. Muscle of the Fascia Lata.
38. Gluteus Maximus.
39. The Upper Part of the Gluteus Externus or Superficialis.
40. Triceps Abductor Femoris.
41. Semi-Tendinosus.
42. Semi-Membranosus (only a small portion is visible).
43. Gastrocnemius.
44. Soleus.
45. The Tendo Achillis, which comes from the Gastrocnemius Muscle, but it is also partly formed by the
46. Superficial Flexor of the Phalanges or Perforatus.
47. Deep Flexor of the Phalanges or Perforatus—(a) Lateral, (b) Middle, (c) Larger Heads.
48. Anterior Extensor of the Phalanges.
49. Lateral Extensor of the Phalanges.
50. Oblique Flexor of the Phalanges.
51. Flexor of the Metatarsus.
52. Muscles which elevate the Tail.
53. Muscles which curve or draw the Tail to one side.
54. Muscles which curve or draw the Tail downwards.

supplied with bloodvessels, nerves, and absorbents. Their action is under the influence of the nervous system. In a state of rest, is said to be neutral, or slightly alkaline, but becomes acid when in action. In close connection with the muscular system there is also other tissues, such as fibrous, yellow elastic, and adipose.

120. **Cellular or Areolar Tissue** consists of fine fibres interwoven together, forming a network. It is found in all the organs of the body, giving support to their substance, and holding them together and holding them in position. Cellular connective tissue having large interspaces.

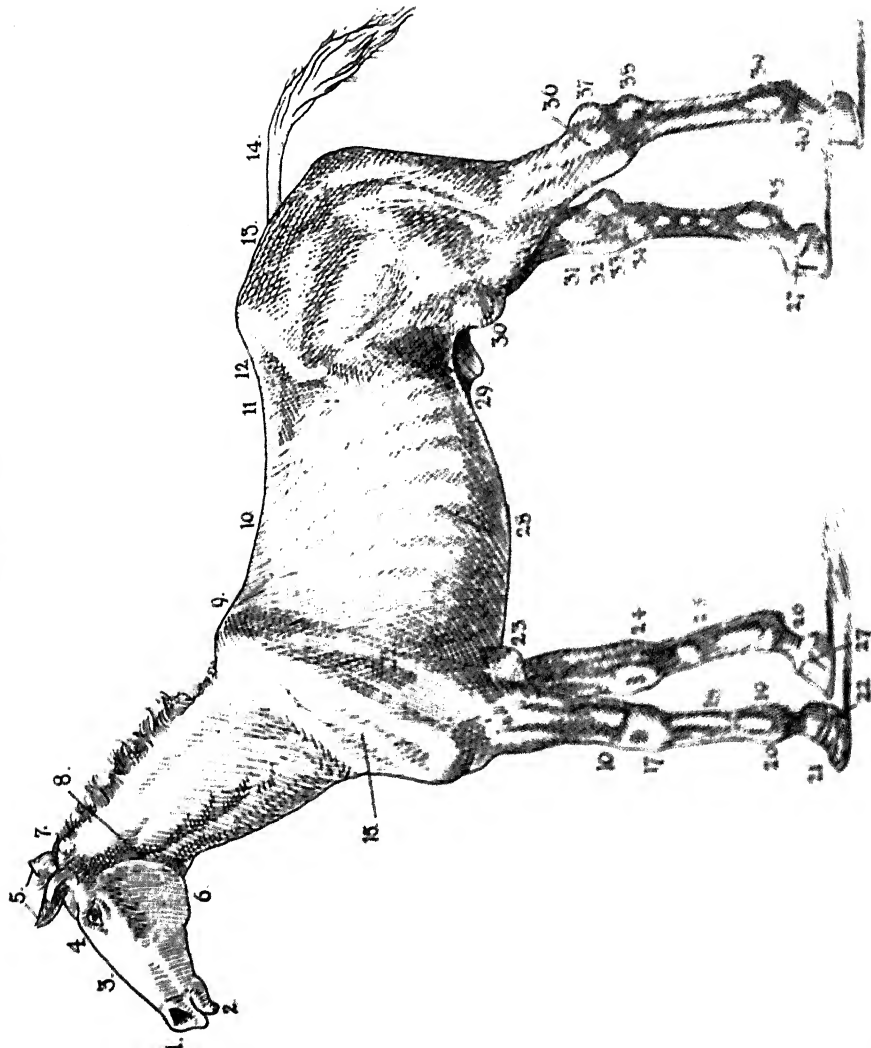
121. **White Fibrous Tissue** is made up of fine white fibres, and is the very tough, unyielding tissue in the tendons of muscles and most ligaments; also in the periosteum, pericardium, etc. Fibrous connective tissue of the body, and composed of fibres.

122. **Yellow Elastic Tissue** consists of yellow elastic fibres, which are much larger than those of the white fibrous, but not so tough or strong, and, as the name indicates, is very elastic. It is of this connective tissue that the middle coat of the arteries is formed, and it is very plentiful beneath the skin. It is also found in certain ligaments, the *ligamentum nigrum* being entirely composed of this tissue.

123. **Adipose or Fatty Tissue** consists of cells containing an oily substance, held together by a cellular tissue. It is found in nearly every part of the body, beneath the skin, around joints, and enveloping the kidneys.

124. **Tendons or Sinews** are amber-coloured fibrous structures, forming bands and cords attaching muscles to bones, and found at the ends of muscles at their point of termination. They are most abundant in the limbs, and extremities, shielding and protecting joints; at the same time they are spread out like a fine, strong, thin membrane, in the situation and action. They are very strong and flexible, and of great strength with lightness; their extreme str

PLATE IX



## EXPLANATION OF PLATE IX

### HORSE, SHOWING VARIOUS DEFORMITIES AND DISEASES

- |                                   |   |
|-----------------------------------|---|
| 1. Nostrils.                      | 22. Sidebone.                                 |
| 2. Dropped Lip.                   | 23. Capped Elbow.                             |
| 3. Roman Nose.                    | 24. Mallenders.                               |
| 4. Eye.                           | 25. Seat of Splint and Speedy Cut.            |
| 5. Lop or Pig Ears.               | 26. Cracked Heels.                            |
| 6. Sub-Maxillary Glands.          | 27. Sanderack at Quarter.                     |
| 7. Poll Evil.                     | 28. Flat Ribbed.                              |
| 8. Parotid Gland.                 | 29. Tucked-up Flank.                          |
| 9. Fistulous Withers.             | 30. Enlarged Stifle-Joint.                    |
| 10. Saddle Galls.                 | 31. Bursal Enlargement.                       |
| 11. Loins.                        | 32. Bog Spavin.                               |
| 12. Ragged Hooks.                 | 33. Sallenders.                               |
| 13. Mule or Goose Rumped.         | 34. Bone Spavin.                              |
| 14. Rat-Tailed.                   | 35. Grease or Grapes.                         |
| 15. Shoulder Galls.               | 36. Thoroughpin.                              |
| 16. Knee Windgalls.               | 37. Capped Hock.                              |
| 17. Broken Knees.                 | 38. Curb.                                     |
| 18. Sprained Tendon.              | 39. Enlarged Fetlock.                         |
| 19. Windgalls.                    | 40. Knuckling Forward from Contracted Tendon. |
| 20. Knuckling Over at Fetlock.    |   |
| 21. Foot Deformed from Laminitis. |   |

illustrated by the everyday occurrence of slaughtered animals being suspended by their *Achilles tendon*, or ham-strings. Tendons are brought into action by the middle or fleshy part of the muscle contracting and relaxing. To keep the muscles in proper order, good grooming and regular exercise are highly necessary—a profession in itself—as in training race-horses, etc.

**125. Involuntary or Non-Striated or Non-Striped Muscle** consists of spindle-shaped cells, each with its own nucleus. The cells are arranged in such a manner that they overlap, and are held together by a small amount of intercellular cementing substance. They are most commonly collected into bundles of varying size, which may cross each other or interlace. Although involuntary muscle, as its name indicates, is beyond the control of the will, it is none the less necessary that it should be supplied with nerves. It is chiefly found in the walls of hollow viscera, such as the stomach and intestines, the urinary bladder, the uterus, etc., and also forms an important constituent in the formation of the coats of bloodvessels. In the hollow viscera the muscular tissue is very pale, thus differing materially in appearance from the voluntary muscles of the body. The heart contains a form of muscular tissue which is involuntary, but possesses a deep red colour.

**126. Muscles and Tendons** are subject to *injury* and *disease* of various kinds. Injury may be caused by **wounds**, and these may be—

- (1) **Incised**—*i.e.*, clean cut, as with a sharp cutting instrument.
- (2) **Bruised or Contused**, when caused by severe blows or falls.
- (3) **Lacerated**, when the skin and flesh are torn by a foreign body, as by barbed wire or a cart shaft, etc.
- (4) **Punctured**, when made by a pointed object, as a prick or probe with thorns, or stabs with pitch-forks, etc.
- (5) **Gun-Shot**—from shot, bullets, etc.
- (6) **Poisoned**—from, say, the use of arsenical sheep-dip, wasp-stings, snake-bites, etc.



127. Of the foregoing, the only one that might heal by first intention is the incised or clean-cut wound; but such is rarely seen in domestic animals. However simple the injury may be, it ought to have early care and attention, as it might result in sloughing, or mortification with *septicæmic* blood-poisoning, or *pyæmia*, as when abscesses are formed in different parts of the body—well exemplified in bastard strangles.

128. **Incised Wounds** are wounds caused by sharp cutting instruments. *Treatment.*—First examine the part, remove all the blood-clots, etc., from the wound, and stop the bleeding. If the blood be *bright scarlet* and spurting out in jerks, an **artery** has been wounded. To arrest the bleeding, at once, when practicable, tie a cord, handkerchief, or bandage loosely around the limb, above the wound; insert a pocket-knife or piece of stick beneath the cord or bandage, and twist it round and round tightly until the bleeding stops, when the ends of the damaged vessel may be tied with a piece of silk, or even cotton, thread. Arteries are sometimes injured on one side only; this is very dangerous, and the bleeding is difficult to stop. In this case the vessel has to be completely divided—which should only be done by a professional man—when the cut ends will contract into the neighbouring parts and the bleeding cease. Blood from **veins** is *dark red*, and pours out of the wound in a continuous stream, turning brighter in colour as it runs down the leg or side, under the oxidizing action of the air. This bleeding may be stopped by applying the point of a red-hot poker to the vessel, or by placing a pad of tow over the place and securing it with a bandage where practicable. Plugging the wound with tow (which can be readily made by teasing out a piece of soft rope) is also of great service, and should be done thus: First soak the tow well with antiseptic mixture (*par. 1060, No. III.*), then plug it tightly into the bottom of the wound, securing it in the place by pulling the edges of the wound together with stitches of antiseptic silk, cord, catgut, or silver wire. In about thirty or forty hours after the plug may be carefully removed and the injured part re-dressed with the antiseptic mixture.

129. When the cut surface casts off a fine thick, yellowish-white, creamy pus, or matter, and the wound assumes a nice strawberry colour, it is a sign that healthy action has taken place, in the shape of granulation. Excessive granulations, however, must be kept in check by the application of some caustic lotion or powder (*par. 1060, Nos. V. and VI.*). To keep down undue inflammatory action nothing is better than cold water bandages or cloths kept constantly wet by pouring cold water over them from time to time. These should be continued until healthy matter is seen coming from the wound (*par. 33*).

130. After the edges of a clean-cut wound have been drawn together with stitches—sutures—I have frequently seen good results from covering the part with green (Stockholm) tar. This acts as a good antiseptic, and keeps the air from the wound; it also has a tendency to keep the stitches from suppurating out, thus preventing the lips from gaping open. This is of most value in cases of injury to the neck, ribs, hips, and thighs. When bandages can be used, a pledget or small compress of tow or cotton-wool, saturated with a mixture of oak varnish and iodoform, can be applied to the wound before putting on the bandage (*par. 1060, No. VII.*).

131. **Bruised and Contused Wounds** may be considered as one, and are those in which the parts are injured with or without an abrasion of the skin—a good example being a black eye in the human subject. In domestic animals these wounds are generally caused by kicks, blows, prods from a cow's horn, slipping on ice, etc. The bleeding takes place under the skin, the blood coagulating and arresting the hæmorrhage. Sometimes these injuries are very extensive, and should not be interfered with by an amateur, nor should they be cut into for eight or nine days, when a good opening must be made and the clotted blood removed; the wound may then be dressed with the antiseptic mixture and tow (*par. 128*). Frequently they suppurate and form matter; or the watery portions may become absorbed and the solids organized, and form a big hard lump—a tumour. A good example is the breaking of the 'belly-rind' by one cow 'dumping' another, or through the kick

of a brutal cattle-man or horse-man. In such cases cold water bandages can be applied, or the parts may be thickly and loosely covered with cotton wadding and firmly bandaged.

132. **Lacerated Wounds** are when the skin, flesh, and tissue are torn in an irregular or jagged manner, and caused by the animal coming in contact with some sharp body, such as barbed wire. Strange to say, we have little or no bleeding from this class of wounds. Their treatment is simple: Dress with the antiseptic mixture, and draw the parts together with sutures; then keep the inflammation in abeyance, by means of cold water applications, until healthy matter comes from the wound, which generally heals by granulation—this, of course, must be kept in check by caustic applications (*par.* 1060, Nos. V. and VI.).

133. **Punctured Wounds** are produced by sharp-pointed objects, such as knives, pitchforks, stakes, thorns, etc., and are at all times regarded as dangerous. A minute examination should be made, as frequently a piece of wood, etc., is found, after many days, at the bottom of the wound. In all cases the foreign body should be carefully removed where practicable; but in some cases it is dangerous to remove it at first, and it has to be left to suppurate out of itself, or until it can be removed without risk. When the bleeding is excessive it must be stopped by plugging, and the part treated as described under Incised Wounds (*par.* 128). There is always a great danger of blood-poisoning setting in, especially if the thick part of a muscle be injured; and in no case should this description of wound be 'tinkered' with, more particularly if the wound takes a downward direction—*i.e.*, the internal part of the wound is lower than the external opening—in which case it has to be cut into. Punctures from thorns, in the hunting-field, often cause a great deal of lameness, as well as constitutional disturbance, more particularly if in the knee, hock, or other joint; and if a piece of thorn has been broken in under the skin cold water bandages answer best until suppuration sets in, when the thorn can be removed. Punctured wounds also frequently cause lock-jaw, when the irritating cause is such as nails in the feet.

134. **Gun-Shot Wounds** are caused by bullets and shot, and are mostly met with in time of war, but are frequently found in dogs. The bullets or pellets should be removed if practicable, then dress as under Incised Wounds (*par. 128*); but the bullets or pellets may often be left in the part with safety, Nature enveloping them with a covering of dense tissue, when they cause little inconvenience.

135. **Poisoned Wounds** may be due to poisonous medical agents, to bites and stings of different animals, or to septic organisms. Where the skin has been damaged by lice or otherwise, numerous animals have been poisoned by being subsequently washed with arsenical dips, *therefore arsenical preparations should never, under any circumstances, be used for washing horses, cows, or dogs affected with lice.* Poisoned wounds in animals are also caused by wasp-sting, snake-bite, etc. For stings, apply a diluted solution of ammonia. In bites from dogs, the best treatment is to wash the part well with cold water, and apply tincture of iron. (For Septic Poisoning, *see par. 34.*)

136. From wounds of every description we may have a great deal of constitutional disturbance—sympathetic fever—when the temperature rises to  $104^{\circ}$  or  $106^{\circ}$ . This also must be attended to (*par. 38*). All wounds in the process of healing are greatly assisted by a daily application of a solution of iodine prepared as follows: Iodine 1 drachm, iodide of potassium 2 drachms, water 1 pint, mixed, and a little applied with a feather.

137. **Lacerated Muscles.**—Muscles occasionally become lacerated, or torn, without the skin being broken or any swelling or lameness being visible, the animal merely going 'stiff.' All the muscles of the body, those of the neck, back, loins, quarters, etc.—from slipping on the ice, falling, galloping, jumping, etc.—are liable to this; and to arrive at a proper conclusion, the history of what the animal had been doing previously is indispensable. Frequently nothing is seen until the flesh is noticed to waste away from the part—as, for example, the so-called shoulder-slip in young horses when first put to work. If the animal does show lameness, rest, with cold water irrigation by means of the hosepipe, or tub and tube irrigation, several times a day, answers well (*par. 71*), and a

run at grass is to be highly recommended, while, at times, blistering may be found expedient.

138. **Lameness of the Shoulder** may arise from many causes, such as an injury to the muscles of the shoulder, or to the long muscle of the neck, or to rheumatism, disease of the liver, or even a slight disorder of the stomach, caused by a feed of new oats, Indian corn, or strange food of any kind, inducing indigestion. In all these cases the symptoms of the lameness are much alike: the limb is carried stiffly, and swung in a round-about, outward manner, with dragging of the toe. To detect from what source it arises, the history of the case is necessary, accompanied by the eye and finger of an expert. It may be from any one of those already enumerated, or others not mentioned, so that a careful and proper examination must be made before any treatment is adopted. If from injury, cold water irrigation daily, followed by blisters and long rest, should be resorted to; if from indigestion or change of food, one ounce of carbonate of soda daily for a few days in the food will be found very beneficial.

139. **The Shoulder Joint** is also frequently the seat of disease, either from injury of the joint itself or through the muscle—**flexor brachii**—as it passes over the head of the humerus, being sprained, or from the sprain of some of the muscles in the near neighbourhood of the joint. The point of the shoulder is occasionally damaged by the animal running against some hard substance, such as a stone wall, etc. Any one of these injuries causes great pain, lameness, and enlargement of the parts.

140. **Treatment**.—Rest is the first essential; then hot or cold applications of water may be tried, followed by blistering. Setons act well at times in such cases, with a run out on grass.

141. **Rheumatism** may be regarded as being due to some peculiarity in the blood, the exact nature of which is not as yet known, and is both acute and chronic. Nearly all the structures of the body are subject to its baneful influence. It is not, however, so common in the horse as in the human subject; but, from long

observation, I have met with it in certain breeds of horses, and have generally traced it to hereditary causes, and have usually found it associated with heart affections.

142. **Treatment** of rheumatism is not very satisfactory, but when much pain and constitutional fever are present, ounce doses of sulphate of magnesia or sulphate of soda, along with  $\frac{1}{4}$  oz. of nitrate of potash, may be given night and morning, in a mash, with 2 to 3 drachms of salicylate of soda at noon, or quinine in 1 to 2 drachm doses twice a day; if the pain is very acute, hypodermic injections of morphia are useful.

143. **Cripples, or Crockles**, is a rheumatic affection of the muscles from which cattle sometimes suffer, and which is generally known by these names, most frequently occurs on strong, undrained land or on sour, mossy ground. The animal suffering arches its back and walks as if on stilts; it becomes hidebound, milk and flesh disappear rapidly, and the beast is very fond of chewing bones, stones, and foreign bodies. A change of pasture, with doses of 10 ounces linseed oil and 1 ounce of turpentine, twice or thrice weekly, I have found to answer best in such a case. Dressing the land with lime or salt is also to be highly recommended. In some farm buildings young bulls under twelve months old are occasionally affected in a similar manner, and I attribute it to the arrangement of the boxes, their imperfect sanitation and ventilation, but more particularly their ground floor, which is frequently found to be laid with old red sandstone flags, having bad drainage, and with ground damp evaporation. In these cases I always recommend that the floor be pulled up, the soil dug to the depth of 8 or 10 inches, then filled with stones, bricks, sand, etc., and paved on the top with the old-fashioned blue cobble or fluted stable bricks. Dry wooden portable beds, raised 4 to 6 inches, also answer admirably. The animal also ought to have the run of a large yard or paddock in dry weather, while half the quantity of oil and turpentine mentioned above should be given. Two-drachm doses of salicylate of soda may also be given once or twice a day.

144. **Kennel Cripple or Lameness** in dogs is a form of rheu-

matism, and is not now so common as formerly. It is analogous to the foregoing complaint, and due to a similar cause. Sanitation, ventilation, and good dry wooden beds, raised 18 to 20 inches from the ground, are necessary, as well as a good dry ground floor. Change of quarters, and 15 to 20 grain doses of salicylate of soda twice a day, are recommended for the treatment of this disorder.

145. **Poll Evil** is of an ulcerative or fistulous character, with open sores discharging a thin glairy matter; it is a very troublesome complaint, and occurs just behind the ears (*Plate IX., No. 7*). It is caused by an injury to this part, for instance, from a blow with a big stick, wielded by a brutal stableman, or through the horse, when in a low-ceilinged stable, throwing up its head and striking itself against the beams, or from a heavy, grandly furnished bridle. At first the animal goes with its neck very stiff, and points its nose, with drooping head; it flinches when the collar or bridle is put on; and then swelling of the part is next noticed. As this is a very formidable disease to deal with, it should at once be put in the hands of a qualified man. At first cold water cloths ought to be constantly applied, afterwards blistering may be necessary, and, finally, an operation. As the part affected is of low vitality, great care and judicious treatment must be exercised, or the disease may extend to, and cause, *caries* of the bones. Injecting the sinuses with a solution of peroxide of hydrogen answers well both for this and also for fistulous withers.

146. **Fistulous Withers** is similar in character to poll evil, and, as the name indicates, is a disease found at the top of the shoulders (*Plate IX., No. 9*). It is due to some damage done to the neighbouring parts, as from one horse biting another; or through injuries to the bony spines by blows; or from nips from badly fitting riding or harness saddles. Here again swelling is the first visible indication, and prompt attention is necessary. Cold water cloths should be applied and kept constantly wet, and the saddles must be examined and altered; again, on account of its formidable nature, the case should not be 'tinkered' with, but must be immediately placed in the hands of a professional man.

147. **Elbow-Joint** (*Plate IX., No. 23*) is also subject to injury from kicks and blows, as well as from the shoes being made too long, or with too much caulking, thus damaging the elbow-point when the animal lies down. If the shoe is the cause, it must be at once removed and remedied to prevent further injuries from that source; a stocking-leg stuffed with horsehair, or special pad, should be placed round the pastern every night. Hot or cold fomentations ought to be applied to the damaged elbow, night and morning, with soothing absorbent lotions (*par. 1069, No. 1*), but beware of strong, stimulating embrocations. Should the tumour be soft to the touch, and just underneath the skin, it may contain watery fluid (serum), or matter, when it will have to be opened; if it is hard, or deeply seated, a small piece of 15 per cent. of oleate of mercury, applied every other day, can be tried.

148. **Broken Knee** (*Plate IX., No. 17*) is an injury of greater or less extent done to the front of the knee, and of frequent occurrence. In some cases it is slight, only abrasion of the skin, in others so extensive that the joint may be permanently damaged; particularly so when it is laid open and the ligaments and tendons injured. The parts to be treated must be properly cleansed from all sand, grit, etc., then a pledget of tow, saturated in the antiseptic mixture (*par. 1060, No. 3*), should be applied, secured with cold water bandages, which must be kept constantly wet and not removed for three days, unless the leg swells very much. The animal should have its head tied close up to the rack, so that it cannot lie down. Any constitutional disturbance that may arise must be treated as **sympathetic fever** (*par. 38*). If the joint be damaged, and joint oil run from the wound, a special tin splint must be placed at the back of the knee to keep it steady. The cold water bandages keep the inflammatory process in check, conducing to healthy action and closing the wound by granulation, which may appear in eight to ten days; then the cloths must be removed and the wounds left bare, dressing it daily with suitable caustic lotions or a preparation of iodoform (*par. 1060, No. 7*). A good blister and a run at grass may be



necessary, but the skin, once destroyed, is never reproduced. In treating these cases, great care is required in dieting the animals, keeping them cool and quiet, as at times lock-jaw supervenes. When the injury is slight, dressing the parts either with Friar's Balsam or flexible collodion twice a day is all that is required.

149. **Speedy-Cut.**—This is a bruise on the inside of the fore-leg. It may be between the knee and fetlock, at the knee, or even, in a high-actioned horse, above the knee. It comes under the class of contused or bruised wounds, and is caused by the horse striking the inside of one fore-leg with the opposite foot; very careful shoeing is required, while the damaged part should be treated as under Contused Wounds (*par.* 131).

150. **Brushing and Cutting** may be classed under the same heading as *speedy-cut*, being caused by one foot striking the fetlock of the opposite leg; both fore and hind fetlocks are liable to the injury, but the hind ones more frequently than the fore. The causes vary: sometimes it is the outer rim of the inner web of the shoe that brushes or cuts the joint; in other cases the toe or inner quarter of the hoof itself is at fault (*par.* 177, No. 9).

151. **Sprain of the Tendons or Back Sinews** and their sheaths may be said to be laceration of the tendinous fibres, causing heat and a painful swelling. This usually occurs below the knee, just where the inferior check ligament joins the tendon (*Plate IX., No. 18; also Plate XI., Fig. 6, E*), but any portion of the latter is liable to lesions, and it is most frequently seen in the fore-leg, specially in cart-horses having heavy loads to pull up steep hills. High-heeled and high-toed shoes may have something to do with causing it, also slipping on ice, overreaching in jumping, etc. The animal steps short, and rests the limb whenever it has a chance. On examining the leg the damaged part is found to be swollen and painful on pressure. The most essential point towards recovery in such cases is entire rest from work; but this rule is 'more honoured in the breach than in the observance,' and the poor brute is frequently kept at work till repair is hopeless. First, then, as

already said, entire rest is necessary ; next, the application of a cold water bandage. The shoe must be removed and the heel slightly elevated, so as to act as a support to the part ; or the following, as recommended by Captain M. H. Hayes, F.R.C.V.S., may be tried : 'A good ply of cotton wadding to be wrapped loosely round the part, and held in its place by a long calico bandage rolled firmly round the leg, to be taken off and re-wrapped once every twenty-four hours.' After the active symptoms have abated, blistering should be resorted to and the animal turned out to grass. Firing before turning out may be necessary, and is as a rule very effectual, and at times good results are obtained by the application of the adhesive plaster bandage. When the animal is worked too long and the case neglected, the tendon becomes so much contracted that the fetlock knuckles over and the animal walks on its toe. A special shoe with a turned-up toe is required for this, and the operation of **tentotomy**—dividing the tendon—has to be performed. From this it will be seen how highly necessary it is to give rest in the first stages, and thus obviate future ill-consequences.

152. **Break-down**—a laceration of the suspensory ligament, the flexor tendons, or fracture of the sesamoid bones, allowing the back of the fetlock to come to the ground—is of common occurrence in race-horses, steeplechasers, and hunters. For this cold water bandages with splints may be applied until the active inflammation is arrested ; the animal should also be put on slings, and dieted on mashes or green food ; finally, a plaster-of-Paris bandage or the adhesive plaster bandage may be applied, and the horse turned out to grass.

153. **Sesamoiditis** is inflammation of the joint at the back of the fetlock, due to some injury, either to the small bones or to the ligaments or tendons in connexion with them (*Plate IX., No. 39*). The parts are much swollen and tender to the touch, while the fetlock stands forward and the animal steps short. When certain that this is the seat of lameness, cold water bandages can be used first with complete rest, and the adhesive plaster bandage may be applied, but, finally, blistering or firing may have to be resorted to. In the early stages of both *break-down* and *sesamoiditis* the cotton

wadding wrapping with bandage and splints can also be used as noted in Sprain of the Tendons (*par. 157*).

**154. Hip-Joint Lameness** may arise from a variety of causes, such as sprain of the muscles, tendons, or ligaments in connexion with the joint and the head of the hip bone. As in the fore-leg the shoulder was generally considered the seat of lameness, so in the hind-leg the hip is often pointed to when the cause is really in some portion of the limb below, thus showing that lameness in this part is by no means easy to trace, as it may arise from muscular sprain, or from some nervous derangement, such as sciatica, etc. So that before any treatment is adopted a qualified practitioner should be consulted, as I have often seen a large surface of the skin permanently damaged by the use of some fancy advertised quack nostrum, the animal having rubbed the part after application and thus destroyed the skin. When certain that the lameness is in the hip, rest, with cold water irrigation for two or three hours twice daily, is of great service. Blisters, setons, and pitch charges are, when desirable, of great benefit.

**155. Windgall** is a puffy, elastic swelling caused by an over-secretion of synovia of the *bursa mucosa*, a fluid similar to joint oil, and is of very common occurrence in nearly all classes of animals, found at the knee and fetlock joints, etc. (*Plate IX., Nos. 16 and 19*). Some classes or stamps of animals are more prone to it than others. The swelling may be brought on by overwork, or by putting the animal to work too soon. It very rarely causes lameness, or in any way interferes with the usefulness of the animal; but still, it is very unsightly and objectionable, and not easily removed. The treatment consists of rest, the application of a cold water, indiarubber, or adhesive plaster bandage and blistering; also firing, when very large. In olden times the enlargement was supposed to contain wind, hence the name.

**156. Bog Spavin** is an overdistension of the capsular ligament of the hock joint, with synovia, and is found on the front and inner part of the hock joint (*Plate IX., No. 32*), and is of the same nature as windgall. It is mostly seen in cart-horses, certain strains

of Clydesdales having a special tendency to it; and it is frequently found in young horses rising two years old, more particularly in overfed, forced animals. It very rarely occasions lameness, and sometimes disappears without any treatment. If hard feeding is thought to be the cause, it should be diminished, and the animal turned out to grass, after applying a good dressing of green tar to the part. Compression, by means of an indiarubber bandage, has also a splendid effect, but when lameness is present blistering and, subsequently, firing have to be resorted to.

**157. Thorough Pin.**—An enlargement of the synovial sac through which one of the tendons passes, and is situated behind the main joint, and in front of the *os calcis*, or point of the hock (*Plate IX., No. 36*). It varies very much in size, and is generally seen more prominently on the outside than on the inside, or *vice versa*, and sometimes it is right through. Pressure on one side makes it more apparent on the other. It seldom causes lameness, but, being unsightly, is very objectionable, and is frequently associated with *large bog spavin*. The treatment greatly resembles that for windgall (*par. 155*). An indiarubber bandage may be applied, or a truss specially prepared for the hock joint may be used, causing compression and absorption. A winter's run at grass, with green tar dressings of the affected part, have also been found to answer splendidly. These bursal distensions, like *windgall*, *bog spavin*, and *thorough pin*, when very large, are sometimes tapped and the oversecretion drawn off by means of a special instrument, an aspirator; but this should only be attempted by a professional man, as it is very dangerous to admit air into a synovial or serous cavity.

**158. Capped Hock** consists of a swelling on and over the point of the hock (*Plate IX., No. 37*), and is of two kinds, either a *serous* or watery effusion immediately under the skin, or a *synovial* or bursal distension. The *serous capped hock* is caused by kicks or other bruises; when recent, it is very painful to the touch. Soothing treatment is necessary, such as hot or cold applications, accompanied by cooling lotions (*par. 1069, No. 1*). All

stimulating embrocations are to be avoided, as they have a tendency to consolidate the effused products. Some animals get capped hocks by scraping all their litter behind them, and then lying down on the bare brick or pavement. This may be remedied by bedding thickly with sawdust or moss-litter. When the swelling is very large it may be opened and the watery fluid drawn off, but great care is required to distinguish the serous effusion from the synovial secretion, and if the synovial bursa is punctured it might lead to serious consequences. The *synovial capped hock* is generally not so painful as the serous variety, but is more deeply seated, and is best treated by repeated applications of 20 per cent. of oleate of mercury.

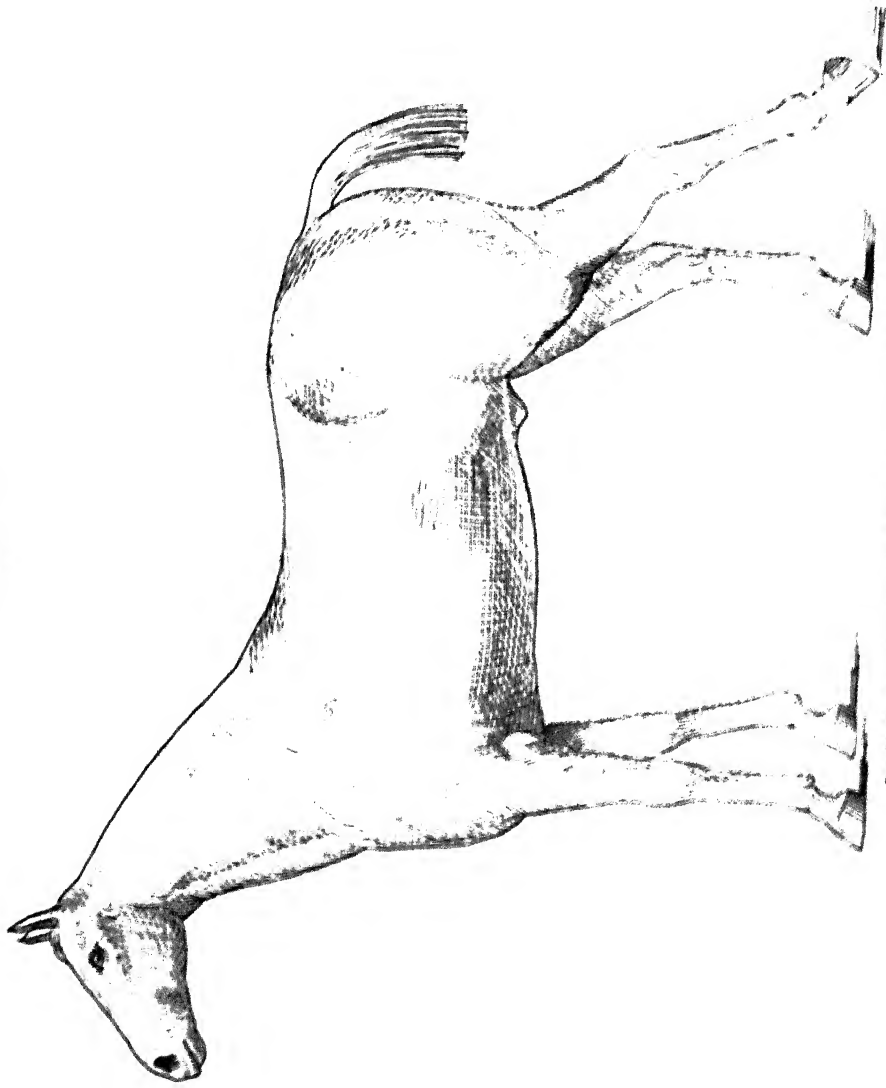
159. **Curb.**—An enlargement seen on the back and lower part of the hock joint where the heads of the small metatarsal bones join the lower row of bones of the hock (*Plate IX., No. 38*). There are two kinds of curb, *false* and *true*. **False curb** is an effusion of serum under the skin, due to a sharp blow on the part. The treatment for it consists of hot fomentations or cold water applications, followed by an iodine blister (*par. 1066, No. 3*).

160. **True Curb** is of a more serious nature, and consists either of a sprain of the tendons passing over the seat of curb or laceration of the *calcaneo-cuboid ligament* at its attachments to the cuboid and outer small metatarsal bone. This is caused by overexertion, as when galloping, jumping, rearing up, etc. Some breeds of horses have joints naturally predisposed to curb—called **curby** or **sickle hocks**—and therefore of congenital formation. In *sickle hocks* the head of the metatarsal is set too far back; and the **os calcis**, the upper end of which forms the point of the hock, is too short and straight up, forming a narrow joint, or 'tied-in' hock, with a sharp angle at the lower part of the front of it. This class of joint is more subject to curb than a well-formed, broad, and developed one. When the enlargement is seen, and the animal is noticed to be lame or the part found to be tender, it should be put off work, and cooling applications used—such as the hose-pipe irrigation of cold water or a cold water

bandage—until the inflammation is reduced ; then iodine or fly-blisters must be used, but the best and most satisfactory treatment for curb or curby hocks is to fire, in lines. I know of no complaint except bone spavin (*pars. 114 and 115*) on which firing has such a beneficial effect as curb.

161. **Sprung Hock.**—This injury varies very much in degree ; in slight cases the ligaments only may be affected, but in more severe injuries not only the ligaments, but the tendons and bones, are implicated. Great pain is evinced, with high fever. *Treatment.*—The patient should be supported by slings, and cold water irrigation applied to the joint until the inflammation and pain subside. Hypodermic injections of morphia near the joint have a soothing effect, while the fever must also be combated (*par. 38*).

162. **Open Joint** is an opening into a joint with the escape of synovia or joint oil. All the joints are liable to be laid open from kicks, probes, and other injuries. The joints most frequently damaged in this manner are the knee, elbow, stifle, and hock. The three latter are very formidable to deal with, and, owing to their arrangement, are difficult to treat successfully. When a joint is opened into, it should have immediate attention, or it may end in a stiff joint, or *caries* of the bone, and even in the death of the animal. As soon as it is ascertained that the discharge coming from the wound is joint oil, entire rest must be given, and cold water irrigation resorted to. The water must be kept running constantly over the part for four or six days. I have on many occasions, with this treatment alone, been successful in stopping synovia and healing the joint. Next to this is the application of a good fly-blister, which has generally the desired effect ; and to turn the animal on to the grazing pasture. The blister causes the parts to swell, thus closing up the opening in the joint and preventing the admission of atmospheric air. Creosote, oil of cloves, or carbolic acid may also be applied to the wound, if thought necessary. Lock-jaw occasionally follows this injury.



DISLOCATION OF PATELLA OR STIFLE

163. **Stifle-Joint.**—Independent of the disease of the bones that enter into the formation of this joint (*par. 113*), the soft structures in connexion with it are frequently the seat of injury and disease. Some breeds of horses are more susceptible to contract diseases and enlargements of this joint than others. Young animals—more particularly of the cart-horse class—are subject to big or distended joints, known as ‘*stifled*,’ or **luxation of the patella** (*Plate IX., No. 30*).

164. **Luxation of the Patella** is a partial displacement of the cap of the stifle joint, and is of a hereditary nature. The young animals, which suffer, as a rule, are very poor, and bad thrivers; and when they stir or walk about, the patella, or cap, slips partly off the joint towards the outside, making a knocking noise. Very hilly pastures are thought to favour the development of the trouble in young horses. The treatment consists of repeated blistering, which sometimes does good, and putting on of a special shoe, thin at the heels, but with a thick projecting toe. But so unsatisfactory, as a rule, are the various forms of treatment that the best plan is to destroy the animal, as it scarcely pays to bring it up for work, and it is of no good to breed from.

165. **Dislocation of the Patella** is a displacement of the patella or cap of the stifle joint. Horses and cows sometimes throw off the cap by jumping up too suddenly. When dislocation takes place, the cap comes to the outside, on account of the ridge on the femur being less on the outside than on the inside. The leg is extended behind in a rigid condition, the front of the point of the toe resting on the ground with the sole of the foot looking upwards and backwards (*Plate X.*). If in the stall, the animal must be got into the yard, a neck-collar put on, and a strong rope passed through the bottom of the collar, between the fore-legs, and tied round the pastern joint of the dislocated limb. The foot must then be pulled forcibly forward under the belly until the sole can rest flat on the ground; the cap must now be manipulated to the front and held there, when, on the horse stepping forward, it readily drops into its place. A good blister should be applied, and the animal tied up short for a week or



so to prevent it lying down, as, when once the cap has been disturbed and ligaments stretched, it is apt to again become displaced.

166. **Hip-Joint Dislocation.**— From some extensive injury this joint occasionally becomes dislocated, being usually accompanied by a fracture. The leg seems much shorter than its fellow, and does not reach the ground. When the dislocation is forward, in front of the articulation, the back of the leg hangs, pressing against the front of the shank bone of the opposite leg, and when the dislocation is backward, the front of the leg presses against the back of the shank of its fellow. When the muscles are so extensively lacerated, and the swelling is great, the animal is usually destroyed.

## LECTURE IV

### THE HORSE'S FOOT: SHOEING, ETC.

167. The horse's foot is made up of soft and hard structures of a **sensitive** and **non-sensitive** nature. The external horny covering or **hoof** is *non-sensitive*, and is made up of the **wall** or **crust** and **bars**, **sole**, **frog**, and **frog band**.

168. **The Wall** (*Plate XII., No. 2, F*) is that portion seen when the foot is placed flat on the ground, and is divided into **toe**, **quarters**, and **heels**; at the latter it turns inwards, and forms the **bars**, which run on each side of the frog, on the ground surface, towards the toe. The wall is thickest at the toe, becoming thinner as it reaches the quarters; while the outside quarter, or *spread*, of the foot is more rounded than the inside, which is nearly straight up. The fore-foot is more of an oval shape at the toe than the hind one, which is oblong, pointed, and straighter up. The wall is said to contain about 25 per cent. of moisture, and externally has a smooth, fibrous-like appearance. These so-called fibres are, in reality, small horny tubes, filled with and matted together by a gelatinous matter; they run from the top of the hoof to the bottom in an oblique manner, and are secreted from the blood by the action of the **coronary band**, or cushion (*Plate XII., No. 3, K K*), which lies in the hollow groove running round the top and inside of the hoof. The **perioplic ring**, or **frog band** (*Plate XII., No. 2, G*), is a light-coloured, soft, horny-like structure, which runs round the top and outside of the foot, at the junction of the hoof and skin, and becomes blended with the bulbs of the frog. It is best seen when the foot is wet, and is thought to have a protective influ-

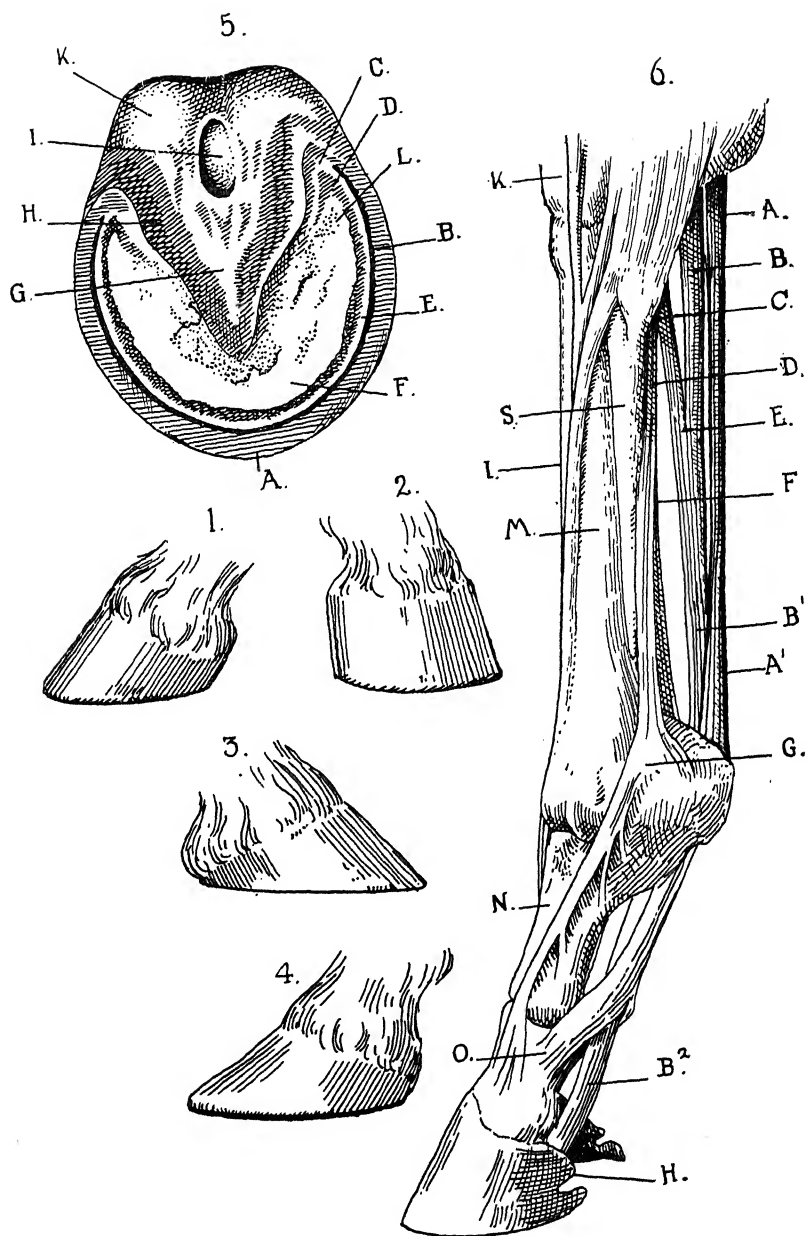
ence on the newly-secreted horn, and should never be destroyed by the rasp. The internal portion of the wall is a leaf like, or **laminated**, structure, which dovetails into the sensitive lamina surrounding the coffin bone. It has been estimated that there are between 500 and 600 of these non sensitive horny laminae and a like number of sensitive ones, each being again studded with about 100 secondary ones, like the barbs of a feather, making the dovetail more complete. These give a surface to the foot, estimated to be equivalent to 8 square feet, or a total area for the 4 feet of 32 square feet.

169. **The Sole** (*Plate XI., No. 5, F*) is the under or ground portion of the hoof, and is slightly concave, filling up the space between the **bars** (*Plate XI., No. 5, D*) and the ground surface of the **crust or wall**. On the ground surface a white rim is seen, called the '**white line**,' which marks the union of the sole with the wall (*Plate XI., No. 5, E*). The sole consists of thin plates of horny material, which flake or fall off successively, when they have done their work, at the ground surface. The internal surface presents a sort of very fine honeycombed appearance, with little depressions, into which dip the papillae of the sensitive sole, and by which the horny matter is secreted. The sole is supposed to contain about 37 per cent. of moisture.

170. **The Frog** (*Plate XI., No. 5, G*) is the triangular elastic pad of horn, containing about 43 per cent. of moisture, fitting into the space between the bars. It runs to a point towards the toe, and at the back forms the **bulbs** (*Plate XI., No. 5, K*) of the heels. The deep cavities between the frog and the bars are called **commissures** (*Plate XI., No. 5, H*) of the frog. Along the middle of the ground surface runs the **cleft** (*Plate XI., No. 5, I*), corresponding to an elevation on the internal surface, which is called the **frog-stay** (*Plate XII., No. 2, M*), and is attached to the fatty frog or sensitive cushion.

171. **The Sensitive Structures** of the foot are: (1) *The coronary band*; (2) *the sensitive lamina*; (3) *the sensitive sole*; (4) *the fatty frog*; (5) *tendons and ligaments*; (6) *bones and cartilages*—all of which are

# PLATE XI



## EXPLANATION OF PLATE XI

1, 2, 3, 4. Varieties of Feet, pp. 96 and 97, *par.* 176.

5. Sole of Hoof.

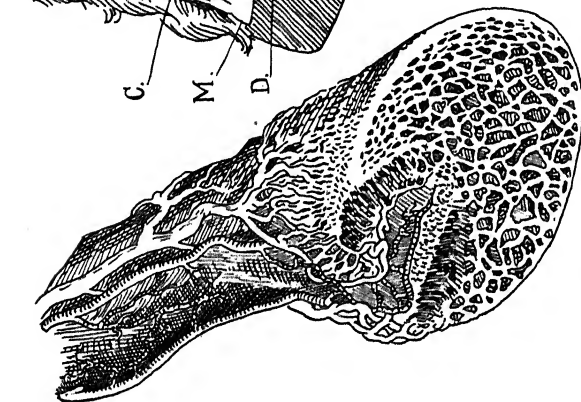
- A. Ground Surface of the Wall at the Toe.
- B. Ground Surface of the Wall at the Quarter.
- C. Ground Surface of the Wall at the Heels, where it turns and forms the Bars.
- D. The Bar.
- E. White Line or Junction of the Wall and the Sole.
- F. The Sole.
- G. The Frog.
- H. The Commissures.
- I. The Cleft of the Frog.
- K. The Bulb of the Heel.
- L. Seat of Corn.

6. Fore-leg from Knee, Showing Bones, Tendons, and Ligaments.

- A. Flexor Perforatus.
- A<sup>1</sup>. Flexor Perforatus.
- B. Flexor Perforans.
- B<sup>1</sup>. Flexor Perforans.
- B<sup>2</sup>. Flexor Perforans.
- C. Metacarpal Ligament.
- D. Suspensory Ligament.
- E. Insertion of Metacarpal Ligament into Perforans.
- F. Bifurcation of Suspensory Ligament.
- G. Continuation of Suspensory Ligament.
- H. Coffin Bone.
- I. Extensor Tendon.
- K. Knee.
- M. Metacarpal Bone.
- N. Os Suffraginis (Large Pastern).
- O. Os Coronæ (Small Pastern).
- S. Splint Bone.

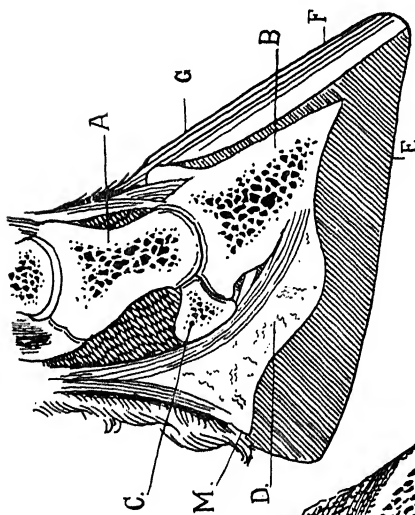
highly supplied with bloodvessels and nerves. The **coronary band** (*Plate XII., No. 3, K K*) is situated in the hollow or semicircular groove which runs round the top and inner aspect of the hoof, and is attached to the true skin by its upper margin, while the under portion is covered with minute sprout-like projections (*papillæ*), which dip into the small orifices of the wall and secrete the horn fibres. The **sensitive laminæ**, or **leaves** (*Plate XII., No. 3, H*), correspond in number to those of the non-sensitive or horny laminæ seen on the inside of the wall of the hoof, to which they are firmly attached. The sensitive laminæ surround the bony structures of the foot, to which they are connected by dense connective tissue, and they assist in the secretion of horn. The **sensitive sole** (*Plate XII., No. 3, I*) is attached to the bottom of the coffin or pedal bone, and the under surface next to the horny sole resembles a piece of fine velvet, being covered with small projecting *papillæ*, which not only secretes the horn, but also gives attachment to the non-sensitive sole. The **sensitive frog** (*Plate XII., No. 2, D*), sometimes called the fatty frog, is situated at the back part of the foot, and lies between the wings of the coffin bone, above the horny frog; it acts as a cushion by supporting the weight in progression (*Side-Bones, par. 192*). The **tendons** found in the foot are the terminal point of the extensor and flexor muscles of the limb, and the **ligaments** are those in connexion with the foot (*Plate XII., Nos. 1, 2, and 3*).

172. In the **Foot** there are **Three Bones**: (1) The **coffin** or **pedal bone** (*Plate XII., No. 2, B*). This bone is crescent-shaped, the body resembling the front of the hoof, with an elevation in front at the top. The two quarters or wings run backwards on each side, to which are attached the **lateral cartilages** (*Plate XII., No. 3, L L*), that so often in cart-horses become ossified and form **side-bones**. The bone itself is very porous in structure, and contains numerous fissures, thus allowing the ramification of nerves, bloodvessels, etc. (2) The **coronary**, or **short pastern bone** (*Plate XII., No. 2, A*), which is situated above the coffin bone, forming with it a joint, into the formation of which also enters—(3) the **navicular**, or **shuttle bone**



1

1. The Foot with Skin and Hoof removed, showing Arteries and Veins ramifying to form a beautiful network.

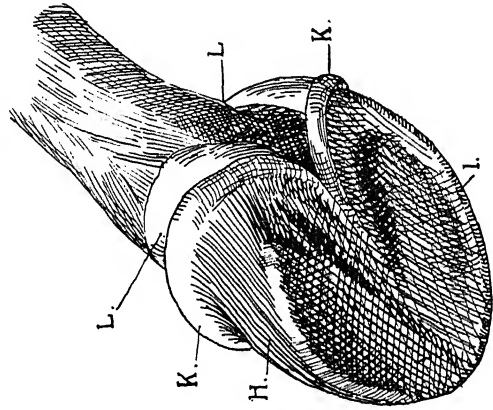


2.

# HORSE'S FOOT

2. Foot sawn through the middle.

- A. Coronet Bone, or Small Pastern.
- B. Coffin or Pedal Bone.
- C. Navicular or Shuttle Bone.
- D. Sensitive or Fatty Frog.
- E. Non-sensitive or Horny Sole.
- F. Non-sensitive or Horny Wall.
- G. The Periopic Ring, or Frog Band.
- M. Frog Stay.



3

3. Foot without Hoof.

- H. Sensitive Laminae.
- I. Sensitive Sole.
- K K. Coronary Band.
- L L. Lateral Cartilage.

(Plate XII., No. 2, C), which, just behind the coffin bone, acts as a fulcrum for the tendon passing over it.

173. **Historical.**—In paleolithic ages there is evidence to show that the horse was an object of the chase and a source of food. In neolithic remains representations of it appear, but still, apparently, only as a creature of the chase. It is first known to have been domesticated by the Egyptians, but not until a late period; at least, no evidence of its having been domesticated can be gathered from the earlier monuments. In the Old Testament (in which the first mention occurs in Gen. xlvii. 17, when Joseph gave his brethren bread in return for horses, etc.) the horse is chiefly referred to in connexion with warfare. In the Book of Job (xxxix.) the war-horse is described as rejoicing in his strength and smelling the battle afar off. Horses, horsemen, and chariots, and trading in horses, are referred to in many places—*e.g.*, 2 Kings xviii. 23; Ezek. xxvii. 14; Zech. vi. 2, 3—thus showing the general usefulness of the horse to mankind. Even in the earliest ages man's attention had been drawn to the brittle nature of the horse's hoof, for in Judg. v. 22 we find it stated that, 'Then were the horsehoofs broken by the means of their pransings.' In the ancient Greek and Roman journals, also, we find that armies had to be disbanded in consequence of the horses' hoofs breaking and wearing; while Suetonius and Pliny, as well as other historians, specially record the horses' frequent incapacity to do work from the wearing of the hoof. The exact time, however, when shoes were applied to horses' feet is not known, but the Persians got the credit of being the first to use them. In a Mosaic painting of Pompeii a shoe is noticed on the foot of the war-horse of Satrapes—333 B.C. In the year 1653 an iron shoe was found in the tomb of Childeric, King of France, who died A.D. 481, and William the Conqueror is credited with having introduced the art of shoeing into this country.

174. The horse's hoof has been a subject of deep study for centuries; and I know of no mechanical contrivance which the mind of man can contemplate with greater wonder and admiration. If there is one thing more than another which has a tendency to encourage



and advance 'science with practice' it is the art of 'horse-shoeing.' For the shoer to have a knowledge of the different forms or kinds of feet, to frame the various kinds of shoes and attach them properly, and then to give a reason for his work, would be, I think, one of the finest examples of 'science and practice.'

175. The horse in its native wilds or at grass seldom has any need of protection for the foot, but the condition of our roads and streets is such that it is necessary to protect this beautiful structure from injury; therefore shoeing becomes a necessity, requiring science and practice for its proper application; and, owing to the great variety of feet met with in the different breeds of horses, and the peculiar formation of some of the hoofs, horse shoeing (with brains as well as with the hands) is actually of much more importance than it is usually credited with. What is the use of a horse, however good or well-fashioned, if it has not a sound foot to stand upon?

176. **Varieties of Feet.**—Among the different types of feet the following are here noticed:

(1) **Sound Feet.**—That which is called a **good, strong, sound foot** has its front wall inclined at an angle of from 45 to 50 degrees, and has the outside wall more rounded than the inner, which is nearly straight up and down, and has a good concave sole. Although the feet vary in colour, a bluish gray has the preference (*Plate XI., No. 1*).

(2) **Narrow Feet.**—The next type is similar to the first, only the heels are much higher, and the quarters and toe more upright. Feet of this kind, although serviceable, are, in light-legged horses, liable to contraction and **navicular disease**, while in cart-horses they are most subject to **side-bones**. The walls and soles are generally strong and hard, but this type requires a great amount of care in shoeing (*Plate XI., No. 2*).

(3) **Flat Feet.**—Some classes of cart and harness horses have **great flat feet**, with very large frogs, and open, low,

**weak heels** (showing that when the frog meets the ground pressure the feet expand at the back), and the sole, as a rule, instead of being concave, is flat. Horses with feet of this kind are certainly useful, but they are best on farms. Such feet are frequently affected with corns and bruises, and are at times troublesome to shoe (*Plate XI., No. 3*).

- (4) **Dished Feet**, or feet with **hollow walls and rounded (convex) pumiced soles**, are somewhat similar to the last, but more pronounced, and are more prone to bruises and disease than any other kind of feet, requiring very careful shoeing, with a shoe well seated on the upper surface next the sole (*Plate XI., No. 4*).
- (5) **Odd Feet**.—Curiously enough, these are often seen in race-horses, and, although one is smaller than the other, there is no disease, and the small foot stands as much wear and tear as its larger mate. These feet generally resemble varieties Nos. 1 and 2, *Plate XI*. A horse's feet, however, may become of different sizes by frequently pulling the shoe off one of them, which is done by the animal galloping round in a circle, the inside fore shoe being apt to be clicked off by the hind one on the same side; and each time the shoe is replaced the foot decreases in size; still, there is no disease. But the foot may also become smaller from disease.

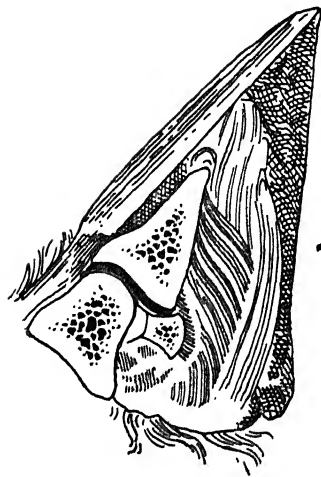
177. **Different Kinds of Shoes** are required, according to the kind or breed of horse, and the work it has to do :

- (1) **Race-horses** require only a very narrow plate, covering the ground surface of the wall, and but slightly overlapping the junction between the sole and wall, or **white line** (*Plate XV., 1 A and 1 B*.) The **French** or **Charlier** system meets these requirements. In this form of shoeing, a groove is made

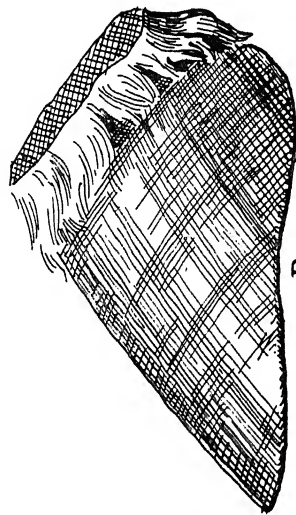
round the ground surface of the wall, into which the shoe is fitted, there being no covering on the sole. It certainly gives the frog full play, but does not answer for animals in use on macadamized roads and paved streets.

- (2) **Hunters** are generally shod with a broader web, having a flat face next the sole, which it slightly covers (giving support to the connexion of the wall with the sole), well seated, and grooved on the ground surface, imitating, as far as possible, the bottom of the foot, so as to get a better grip of the ground (*Plate XV., 2 A and 2 B*).
- (3) **Hackneys and Carriage Horses.**—A shoe is generally adopted that is well seated on the upper surface, next the sole, with a good flat level bearing at the heels, and round the bottom surface of the wall (*Plate XV., Nos. 3 and 2 B*); but for a good foot (as *Nos. 1 or 2, par. 176*), a shoe prepared on the lines of the hunter's shoe is to be preferred.
- (4) **Cart and Waggon Horses** have shoes made similar to those for carriage-horses, but much heavier and broader, being seated on the surface next the foot. They are generally turned up at the heels (caulkings), and have a toe-piece (*Plate XV., 4 A and 4 B*). This turning up of the heel, more particularly in dealing with a young horse, is a great mistake. It should be shod flat, as the heels lift the foot from its centre of bearing, and the frog is taken away from its proper work. This is fully explained under **Side-Bones** (*par. 192*).
- (5) **Bar Shoes** are used for weak heeled horses, or where damage has been done to the quarters. They give additional support and pressure to the frog and relieve side-bones and corns (*Plate XV., No. 5*).

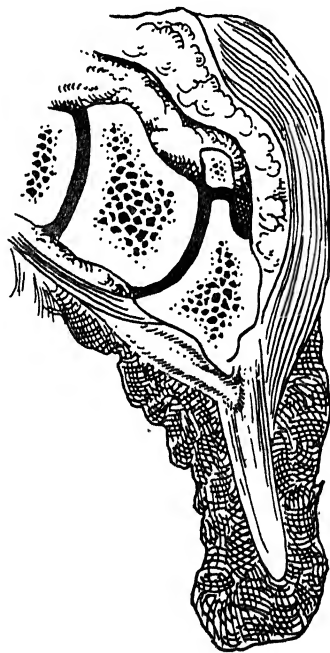
PLATE XIII



A.



B.



C.



D.

A. Section of Overgrown Hoof.  
C. Section of Laminitic Foot.

B. Side-View of Overgrown Hoof.  
D. Side-View of Laminitic Foot.

- (6) **Round or Rocker Shoes** are something analogous to bar shoes. They are very useful for weak feet, and also in cases where there has been extensive inflammation **laminitis**. Their ground surface is formed in the shape of a rocker, thin at heel and toe and thick at the quarter, so that when the horse puts its heel to the ground the foot rocks gently over, and the animal is assisted very much in progression (*Plate XV., No. 6*).
- (7) **Three-quarter Shoes**.—When we have disease of, or injury to, either outside or inside heels, as from corns, etc., a shoe is made with a bar to lie across the frog, while the side of the shoe next the damaged part is cut off to prevent pressure (*Plate XV., No. 7*).
- (8) **Diamond-toed Shoes** have diamond points, and are used on the hind-feet, to prevent the horse from 'forging' or 'clinking'—that is, where the toe of the hind shoe strikes the ground surface of the fore-foot shoe. A young horse, when first put to work, nearly always acquires this habit of 'hammer and pincers,' as it is commonly called, but as it gets into step, this in time leaves it (*Plate XV., No. 8*).
- (9) **Feather-edged Shoes**.—These are preventive shoes, and are more frequently used on the hind than on the fore feet. They are used for animals that buff themselves by striking the fetlock joint or shank on the inner side of the opposite leg. Some young horses are very subject to buffing, and for treatment of the bruises, see *par. 131*. The shoe is made with a feather-edge on the inside, tapering inwards, on the ground surface, towards the frog, nailed on the outside and round the toe. Indiarubber rings, leather pads, or boots, and woollen bandages, are also used to protect the opposite leg from further injury (*Plate XV., No. 9*).

178. In all cases where there is a **good, healthy, well-formed foot, with concave sole**, the surface of the shoe next the foot ought to be flat, so as to give a little pressure to the sole, and also to support the union of the wall with the sole. In weak, convex soles, however, the shoe should be seated so as to meet the requirements of the case.

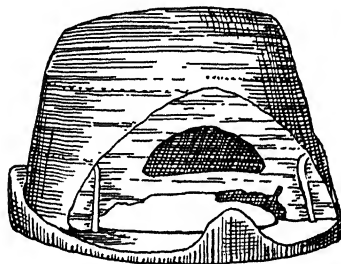
179. **Preparing the Foot for the Shoe.**—A young horse, when first brought in from grass, should be put into a loose, open shed for ten days or a fortnight before shoes are applied to the feet. The ground surface of the crust or wall of the foot should then be levelled with a rasp, to make a good bed for the shoe, which should invariably be a plain one, without the heels being turned up; and on no consideration must the shoe be applied too hot to the foot, for, although horn is a bad heat conductor, yet I have, on several occasions, seen founder (**laminitis**) produced through neglect of this caution. In future shoeing—*i.e.*, re-shoeing—the clinches ought to be carefully turned back, and, if possible, each nail drawn separately, thus preventing the crust being broken; the rasp may then be run gently round the sharp edges of the crust, and, as the foot always grows in length at the toe (*Plate XIII., Figs. A and B*) and very sparingly at the heels, it must be shortened. This is usually done by cutting a piece from the front of the wall, at the toe; but to this method I have great objections. The foot should be shortened by dressing down the ground surface from one quarter round the toe to the other. This, when properly done, gives a level bearing for the shoe, preventing pressure on the heels, without having to spring the heels of the shoe. In paring the sole, only the rough, loose flakes ought to be removed, except in **navicular** disease, where we have, from continued irritation, an overgrowth of horn, in which case *the sole must then be thinned* by paring the ground surface of the sole of the foot.

180. Farmers themselves are very much to blame in not paying more attention to their horses' feet. 'No foot, no horse'—that is to say, no matter how grand and good the animal may be otherwise, it is of very little account if it has not sound feet. Sometimes farmers

## PLATE XIV

### SECTIONS OF HOOF AND SHOE

1.



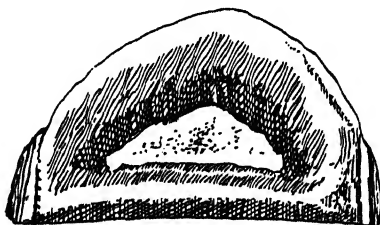
1. Section of Hoof, showing Position and Direction of the Two Front Nails

2.



2 Shoe and Nails *in Situ* showing the Inward Direction of the Nails when driven into the Hoof. Right Side of Shoe showing Clinches turned over.

3.



3. Toe-Piece of No. 1, showing Marks of Nails.

allow a horse to go three or four months without being re-shod, by which time the feet are so overgrown and in such a state that it takes months to get them into form again. It would be much better to take the shoes off altogether, and then the foot, with use, would naturally wear away. Shoes are best removed once every four or six weeks, and should never, on any account, be allowed to remain longer than two months.

**181. Fitting the Shoe.**—Before the shoe is fitted the foot, in many cases, requires a certain amount of trimming; this should be done with care and judgment. Then the shoe should be made to fit level, and be a shade larger than the foot at the ground surface, continuing the angle of inclination of the wall of the hoof. As already said, it must not be applied too hot—just hot enough to make itself a firm bed; neither must it be nailed to fit, as this tears the hoof.

**182. Nails and Nail Holes.**—The fewer nails there are in the shoe the better—but, as a rule, four nails are put on the outside and three on the inside; more are used at times, but if the shoe is efficiently fitted, even a less number may be sufficient. The nail holes, whether punched through the racing or fullering, or stamped, are, as a rule, made so that the nails, when driven, have a decided inward bearing (*Plate XIV., Nos. 1, 2, and 3*), particularly at the toe so as to keep in line with the angle of the hoof, while the quarter and heel nails are more nearly vertical. When the holes are made too oblique, the nails are apt to break off at the neck. Some feet, however, are so constituted that the shoe has to be nailed round the toe instead of the quarter. In driving the nail, care should be taken not to get into the sensitive parts, nor to get so near as to press on them. This shows how necessary it is to fit the shoe properly, and, also, to make the nail-holes at proper angles. After the shoe has been attached, in dressing the hoof, some smiths persist in rasping the walls—'to make them look nice,' they say. To my eye, nothing looks worse than a rasped hoof. By the use of the rasp, not only is the outer covering, *periole*, or varnish-like structure of the hoof, destroyed, but some hundreds of the little fibrous tubes which are



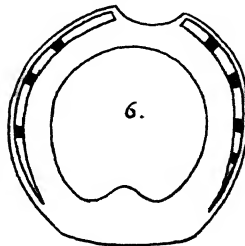
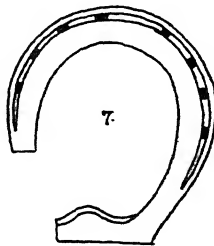
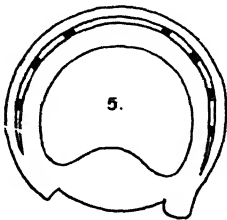
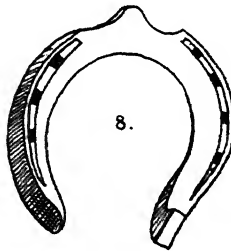
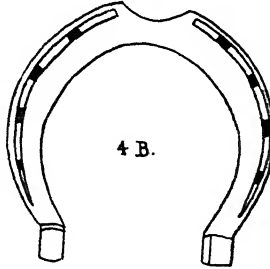
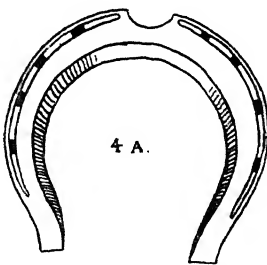
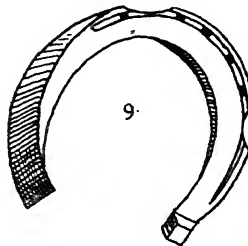
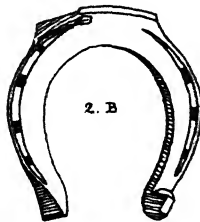
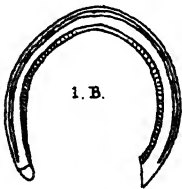
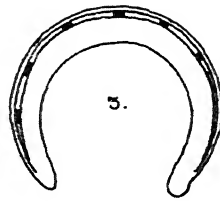
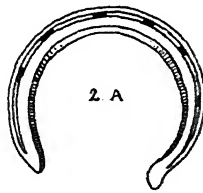
seen running from the top to the bottom of the hoof are wounded and left exposed to the action of the atmosphere, which makes the hoof turn hard and brittle, breaking off where the nails are turned down or clinched. I thus strongly say that the knife and rasp ought to be used sparingly and with great caution. *The hoof must not be rasped above the clinches on any account.*

**183. Stopping for the Feet.**—Numerous authorities do not favour stopping the feet with articles of a moist nature. I was my own groom for over twenty years, and as I did all my work on the saddle, I felt the full benefit of stopping the feet when the roads were hard and dry, for if the practice was omitted the want was readily noticed on mounting next morning. Therefore, in long-continued frosts, or during a spell of hot weather, where a horse is doing a lot of work on the hard dry road, and the moisture of the horn becomes exhausted, I am in favour of stopping the feet, to keep them cool, moist, and pliable. By referring to *pars. 168 to 170*, it will be seen how much moisture the different parts of the hoof contain, and these quantities should be maintained. I have never yet found anything for this purpose to beat cow-dung and clay in equal parts, stuffing the bottom of the feet with it each alternate night.

**184. Leather Soles** should not be used except in cases of injury, when they become necessary; for, to stimulate and preserve the healthy action of the hoof, air should be allowed free access to all parts. **Exercise** also is very essential, in order to keep both the outside and inside of the hoof in sound condition. Without it healthy circulation cannot be maintained in the foot, and the result is disease; therefore, if a horse cannot be taken out every day, it should be turned into a loose-box or paddock.

**185. Indiarubber Pads.**—In connexion with leather soles rubber pads are now made of various descriptions and sizes, and are found to answer well. The **rubber frog pad**, for example, is an artificial indiarubber frog, fixed on a leather sole, which is nailed on between the foot and the shoe, and is very useful for narrow-

# PLATE XV



## HORSE-SHOES

- A. Signifies Fore-foot Shoe.
- B. Signifies Hind-foot Shoe.



Section.

heeled fore-feet and small or wasted frogs. **Anti-slipping pads** are also many, and one of them in common use is a sort of bag of indiarubber, in the shape of the foot, with a corrugated ground surface, and fixed within the inner rims of the shoe. The **frog bar pad** is another indiarubber pad, fixed on to a stout piece of leather, the rubber bar of which runs across the back part of the foot and covers both heels and frog, and is nailed to the foot above a short shoe. This is one of the best forms of pads, for, besides preventing slipping, it is of great service in the case of corns, weak heels, narrow or contracted quarters, navicular disease, and chronic laminitic feet.

186. For further particulars respecting the horse's foot and shoeing, Mr. William Hunting's 'Art of Horse-Shoeing' (third edition) is recommended.

## INJURIES TO, AND DISEASES OF, THE FOOT OF THE HORSE.

187. The foot of the horse is at all times very liable to injury and disease, and in all cases of lameness the foot should be examined to make sure that all is right there, even though the leg be broken. The diseases or injuries to which the feet of horses are most subject are *pricks, corns, quittor, side-bones, sandcrack, seedy toe, false quarter, thrush, canker, treads, overreaches, groggy lameness, and laminitis*.

188. **A Prick from Shoeing, or Otherwise.**—This is the most common injury to the foot. In shoeing, if a nail should unfortunately be driven into the sensitive part of the foot, the owner ought at once to be told of the misfortune. At the same time the shoe must be removed, and the foot put into an antiseptic bran-poultice, made with cold water and a little carbolic acid, and kept constantly wet for a few days, when the part generally heals without any bad effect. But as a rule the nail is withdrawn, and no mention is made of the matter, with the result that the horse is put to work and, in the course of two or three days, becomes lame. The injury may be detected by tapping the part with a hammer, or by removing the shoe and pressing the foot with a pair of pincers, the animal flinching when the injured part is touched. The sole must then be

carefully dressed away, following the black spot with the point of the shoeing-knife, when a dirty, thin, dark-coloured fluid will generally be met with (commonly called gravel) at the bottom of the nail-hole. If left alone too long, this fluid sometimes works under the sole, and, if not liberated, will find its way out at the top of the band of the hoof or at the bulbs of the heel. After the escape of the matter, the foot should be placed in a cold bran-poultice, to which a tablespoonful of carbolic acid, phenyl, or any good antiseptic, has been added, until all the inflammation has subsided; then, after dressing with tow and tar ointment (*Sandcrack, par. 193*), and protecting with a leather sole, the shoe may be put on. Sometimes the nails are driven too near, causing pressure on the sensitive parts and making the animal step short, or decidedly lame. Taking off the shoe and poulticing the foot for twenty-four hours is all that is necessary in such cases, for cutting into the parts does more harm than good.

189. When a horse drops suddenly lame on the road, the foot must at once be examined, to see whether it has been injured by a nail or a piece of wire. If this is found to be the case, remove the foreign body at once, and at the first house on the road wash the wound out by pouring hot water on to it, then heat the nail or piece of wire in the fire, and with a pair of pincers press it into the hole already made, thus cauterizing the wound; a little hard soap may then be pressed into the hole, after which, as a rule, no further trouble arises; but should the animal become lame afterwards, take off the shoe and poultice the foot, as already stated. **Pricks** from nails are very dangerous, and should receive prompt attention, as **tetanus** (lock-jaw) often arises from a simple prick in the foot; yet, strange to say, at the bottom of a coal-pit—where wounds in the feet, from gathered nails, are of frequent occurrence—lock-jaw is rarely or never seen.

190. **Corns** are recognized by a blood-red stain in the horn, and are caused by a bruise or injury, with subsequent infiltration of blood through the pores of the horn. They occur chiefly in flat-footed, weak-heeled horses, and are generally found in the fore-feet, principally in the *inner* corner of the heels, between the wall and

bars (*Plate XI., No. 5 L.*). Hunters are great sufferers from this class of injury, owing to their being shod with short-heeled shoes. Corns are very common, and as they are looked upon as unsoundness, in all cases of examination the shoes should be removed, and the feet carefully searched. When they cause lameness, the shoe should be removed, and the parts dressed out; particularly if the bar is too strong, and doubled over, and pressing on the sole, for it must then be pared away, so as to remove all pressure from the part. At times matter is also formed which must be liberated. In bad cases poultices have to be applied to reduce the inflammation, and a three-quarter or bar shoe (*Plate XV., Nos. 5 and 7*) is found to be necessary; while the indiarubber bar pad is also of great service. If neglected, the inflammation extends to the internal parts of the foot, when pus or matter forms, and finds its way out at the top of the hoof, causing much pain and suffering to the animal, and perhaps ending in quittor.

191. **Quittor** is a fistulous disease of the foot, of a most painful and troublesome nature. Injuries of any description to the foot may end in quittor. It is not often seen in the country, but in towns it is very common. Railway horses are very subject to it, owing to getting their feet fixed in the rails and waggons or carts passing over them. The structure of the foot becomes so much implicated that the bone and cartilage become diseased, when holes, or sinuses, are formed at the quarter and round the band of the hoof. At first cold water poultices may be of some service in reducing the active inflammation, but when the disease has become chronic, blisters, caustic dressings, and the hot iron have to be applied; while, as a last resource, an operation has to be performed by which the diseased bone and cartilage are removed, making the complicated sores into one simple wound. These cases are much too formidable for the attempts of an amateur.

192. **Side-Bones** consist of the ossification of one or both of the *lateral cartilages*, which are situated at the sides and top of the hoof. (*Plate VII., Nos. 7 and 8.*) They are met with in the fore-feet, particularly in those cart-horses which have strong, upright

quarters ; but they are very rarely found in flat-footed horses, hacks, or carriage-horses. The principal causes are hereditary predisposition, injuries of various kinds, overreaches, chafing against the sharp edge of a lea-furrow, etc. ; but, in my opinion, the greatest evil of all is the use of high-heeled shoes, removing the frog from its ground pressure, thus throwing the weight on the lateral cartilages. Above the horny or *insensitive frog* there are elastic fibres running from the inside of one lateral cartilage to the inside of the other, forming what is called the *fatty* or *sensitive frog*, into which is inserted the *frogstay*, or elevation corresponding to the cleft in the middle of the ground surface of the frog. Now, when the weight of a horse is thrown on its foot, the pastern descends, the lateral cartilages yield and bend outwards at the top of the hoof, about the middle of the cartilage, whilst the top of the cartilage bends over and inwards, acting like a spring, letting the weight of the limb gently down on to the fatty frog, which, in turn, presses on the insensitive horny frog, bringing it in contact with the ground, and thus preventing concussion. But when a horse is shod with high or turned-up heels the horny frog becomes displaced, as it were, and thrown out of work, and all the weight is put on to the lateral cartilages, which, in time, through having all their own work, as well as that of the frog, to do, become ossified, and form side-bones (once side-bones, always side-bones), and this process may go on without any inconvenience or lameness. Shoeing-smiths — particularly those in the country—have the very great fault of cutting away the sides of the horny frog, yet it ought never to be touched. When side-bones cause lameness, remove the shoe, and apply cold water poultices until the inflammation and pain has abated, then ease the shoe or substitute a bar shoe (*Plate XV., No. 5*) ; this removes the pressure from the quarters, and throws weight on the frog. In a great proportion of cases no lameness is observed, and although the animals step short, yet they can do their work with little or no inconvenience ; nevertheless, they are always considered as unsound. One or both sides of the foot may be affected with side-bone. When they are very large, and cause much lameness, the hoof is cut through, with a special saw, at the quarter,

from top to bottom, in two places, just below and at either side of the side-bone; then, with a special shoeing-knife, the sole is divided from the crust *at the white line*, at the bottom of the foot, when the piece becomes partially loose, and, on the horse putting its weight on the foot, the saw-cuts spring open, and have to be filled in with bees-wax. A bar shoe is then put on, a blister applied to the band of the hoof, and in a few months the foot expands and the horse goes sound.

193. **Sandcrack** is a fissure, rent, or separation of the horny, fibrous tubes of the hoof to a greater or less extent. It is more common in the town than in the country, occurring most frequently on the inner quarters of the fore-feet, and at times extending from the top of the hoof to the bottom. When slight, it causes little or no inconvenience; but when the fissure extends into the sensitive parts, and any dirt gets in, inflammation sets up, and matter or pus is formed. This must be liberated by cutting each side of the crack, dressing with carbolic oil, and applying poultices; after getting rid of this, a nick should be made with a hot fire-iron across the top of the crack through the horn, or in the shape of an inverted v (thus  $\wedge$ ) close against the hair, and the fissure dressed with tar ointment and tow (*par.* 1072). Then a tarred rope may be wound round the hoof, or a leather strap used, or even, in some cases, a specially constructed clasp may be advisable. The shoe must be eased below the crack, while cold water cloths or swabs, put round the hoof every night, have the best effect of anything that I know of in making the hoof grow. To counteract the brittle nature of the hoof, a mixture of one part of green tar and three parts hard fat or palm oil melted together, and applied round the top of the hoof twice a week, will also be found to answer admirably. A great many writers are against this application, but, from my own experience, I recommend its use.

194. **Seedy Toe**.—A morbid secretion of the sensitive laminae, inducing the formation of degenerate horn (which has a crumbling, sawdust appearance, or, when moist, is of a cheese-like nature), and causing a separation of the laminae from the outer wall of the hoof, along with, when extensive, a bulging out of the wall at the part.

It is due to some injury done to the foot—such as laminitis, or too much pressure by the clip of the shoe—and is mostly found at the toe of the fore-foot, but may occur at other parts of the hoof as well. The hind-foot may also be affected. When seedy toe is suspected, the shoe should be removed, and all the degenerate horn cleared out with a fine-pointed shoeing-knife; then some stimulating dressing should be applied, nothing being better than the tar ointment recommended for sandcrack (*par.* 193). Tar by itself must never be used, as it is too stimulating, and causes a crumbling of the horn. In examination for soundness the shoe should be taken off, as the morbid horn can only be found on the removal of the shoe.

195. **False Quarter** is known by a thin layer of modified brittle horn on the hoof, chiefly on the sides, when the parts are constricted, and form, where it is connected to the ordinary horny hoof, rifts or furrows (resembling sandcracks) on each side; and at times it may overlap the normal part, and is the result of some extensive damage done to the coronary band, or horn-secreting body, from such as stabs, treads, quittor, etc. A horse with false quarter may work equally as well as one with a good sound foot, and without showing signs of lameness if properly shod; but great care is, however, necessary in shoeing.

196. **Thrush** is the term applied to a foetid discharge from the cleft of the frog, varying in character. Some formations of feet are more prone to this than others. It is generally produced by the animal standing in a wet, filthy stable or box, and can exist without causing any lameness whatever; in fact, I cannot call to mind a single case of lameness that could be attributed to thrush. If neglected, however, it may run on until it implicates the sensitive parts and destroys the healthy growth of horn. A change on to good dry bedding in the first instance, bathing the parts nightly with salt-and-water, and dressing with equal parts of iodoform and charcoal mixed—or a little calomel—and pressed into the bottom of the frog cleft with a flat stick will generally have the desired effect. Neglected thrush may run on into that formidable disease called canker.



197. **Canker** is a morbid fungoid growth of horn at the bottom of the foot, implicating the sensitive sole and frog. It may be produced by injuries, also by standing in a filthy, wet stable or box, etc., greasy-legged horses being very prone to it. Instead of the ordinary horn, little soft, spongy, sprouting growths, of a greyish-white appearance, are seen, which bleed on the slightest touch. It is usually first noticed in the commissures involving the bars and frog, and it may extend all over the sole, and affect one or more feet, but it seldom causes much lameness. Being of a very formidable nature, it is very difficult to treat, and should never be tampered with by amateurs. The animal must at once be put into a dry box, as moisture encourages the spongy growths, which develop rapidly. I have been most successful with daily dressings of powdered alum and dry tow, kept in place by a thin plate of iron screwed on to a special shoe, at the same time placing the animal on dry engine ashes instead of straw, and promptly removing all wet matters, such as fæces, urine, etc., as soon as evacuated or observed.

198. **Treads and Overreaches** are injuries done to the top of the foot and caused by the hind-foot overreaching on to the heel or quarter of the fore-foot, or by one foot treading on its fellow. Washing the parts well with clean cold water, removing all jagged edges of the wound with a pair of sharp scissors, and dressing with carbolized oil, will be found to answer in ordinary cases. Should the underlying parts be damaged, and the animal go tenderly and show pain, cold water cloths or poultices must be applied until the inflammation is reduced.

199. **Navicular Disease**, commonly called **groggy lameness**, may be defined as inflammation and ulceration of the tendinous or inferior articular surface of the navicular or shuttle bone, situated at the back of the coffin or pedal joint; or it may be produced by laceration of the fibres of the tendons passing over the bone to its insertion in the floor of the coffin bone, setting up inflammation and adhesion of the parts. It invariably occurs in the fore-feet, affecting chiefly horses of the light-legged class, and is in many cases due to hereditary

causes. Injury from fast work, on hard roads, is another frequent cause, but by far the most common cause is keeping horses in the stable day after day without exercise, then, on taking them out, giving them too much quick travelling, thus lacerating the tendon and setting up inflammation. Generally, the first symptom noticed is the horse pointing first one foot and then the other—that is, if both are affected—so as to ease the tendon as it passes over the acute angle of the bone; but this pointing must be confirmed by other symptoms. When brought out of the stable, the animal affected digs the point of the toe into the ground, stepping in a short and stilty manner until it gets warmed up, when it goes fairly well. The shoe is also much worn away at the toe, and, as a rule, the feet are very strong, high-heeled, and contracted (*Plate XI., No. 2*). Owing to the constant irritation within the foot, there is an extra growth of horn, giving a box-like appearance to the hoof. The disease is never cured, yet an animal can be made to do a great amount of work by careful attention to the feet, such as frequent shoeing, shortening the toe, and dressing the sole thin to relieve pressure, thus removing the overgrowth of horn, and by shoeing with the indiarubber bar pad and short shoe. Further, applying cold water swabs nightly round the feet, and turning the animal into a loose-box, instead of allowing it to stand in the stall, also gives relief. Blistering, frog setons, and unnerving are also useful, but, as above stated, the disease is never cured. As a preventive, however, never allow the animal to stand in a stall for days without exercise. If this cannot be given, turn it into a loose-box.

200. **Laminitis**—inflammation of the sensitive laminae of the feet, commonly called **founder**. The disease, which more frequently affects the fore than the hind feet, is a very formidable one. It has a great variety of causes, such as drinking cold water, standing in a draught, or getting too much oatmeal and water when the animal is heated; overfeeding with boiled wheat or Indian corn, or gorging with oats or potatoes; travelling on snow; galloping on a hard road; applying a too hot shoe to the foot when shoeing; the effects of too large a dose of physic; inflammation shifting from

PLATE XVI



HORSE WITH LAMINITIS (FOUNDER), OR INFLAMMATION OF THE FORE-FEET.

one part of the body to another (*metastasis*); the retention of the after-birth in mares after foaling, etc. It may be *acute*, *subacute*, or *chronic*. The **symptoms** noticeable are that the animal is very unwilling to stir, the body is thrown backwards, putting the weight on to the hind-legs, which are 'propped' well forward under the belly, while the fore-legs are extended well in front (*Plate XVI.*). It moves with great difficulty and reluctance, walking on its heels. In acute cases the breathing is heavy and hurried, perspiration rolls off the body, eyelids are red, nostrils distended, pulse *full* and *bounding*, and the animal stands persistently, rarely lying down. The *treatment* consists of placing the patient in a loose-box, removing the shoes, putting the feet into hot or **cold water** bran-poultices (cold for preference), which must be kept constantly wet, and moving the horse frequently round the box. The cause must also be ascertained. If from overfeeding, a pint of linseed oil should be given, while, in some cases, blood-letting is highly necessary and very beneficial. If from an overdose of physic, doses of carbonate of soda—1 ounce each—may be given in well-boiled thin oatmeal gruel two or three times a day. If retention of the cleansing is the cause, the membranes must be carefully removed, as the smallest piece of the after-birth left in the womb of the mare soon undergoes decomposition, and the septic material is readily absorbed and carried through the system, and in many cases induces laminitis of a septic character; therefore the womb must be washed out by means of an injection of 6 quarts of tepid water, containing 1 ounce tincture of iron or some other antiseptic, while antiseptic medicine should be administered (*par. 1067, No. II.*). A dose of the prepared solution of **adrenalin** injected under the skin over the fetlock joints has been used with success. Finally, round rocker shoes, as described under Shoeing (*par. 177, No. 6; Plate XV., No. 6*), must be put on. At times, in severe cases of laminitis, the foot has to be opened at the toe to let out the effused material, as it is so great in some cases, especially those neglected at the first, that, if not liberated, it causes the sole to come down, producing great deformity of the foot. Founder is, therefore, by no means a fit case for an amateur to dabble with, and should have professional attendance from the first.

In severe cases of laminitis the foot becomes elongated at the toe, the point of the coffin bone is dislodged and drops down to the sole of the foot, and numerous irregular (*ribbed*) rings form round the hoof (*Plate XIII., C and D*). Rings, however, are also formed round the hoof from irregular nutrition, caused by frequently changing the animal from a grazing pasture to the stable, but these rings are more regular, and are seen on all the four feet.

## INJURIES TO, AND DISEASES OF, THE FEET OF THE COW, SHEEP, DOG, AND PIG.

### COW.

201. **The Foot of the Cow**, like that of the horse, is made up of *sensitive* and *non-sensitive* tissue; but, unlike that of the horse, it is 'cloven'—*i.e.*, divided into two sections, or toes, each containing three bones, thus showing six small bones in the foot, instead of three as in the horse. The non-sensitive or horny part is secreted and attached to the sensitive structures similarly to that of the horse, only the laminæ and villi are much finer. The foot of the cow at the heel is deeper, more upright, stronger, and broader at the sole than the foot of the horse, while the claws are pointed and twist slightly towards each other. The **wall** is convex on the outer part, and at the toe makes a very acute and strong turn inwards, and runs back in wavy lines on the inner aspect of the claw, where it is met by the portion winding round the heel, to which it is united by a section of horn springing up from the sole; this is well defined in the foot of the sheep. The **horny sole** is flatter and smoother than in that of the horse, and is partially overlapped at the heels by the wall. Unlike the horse, the cow has **no frog**.

202. The cow is not nearly so subject to disease of, or injury to, the foot as the horse. Great lameness is, however, often induced by foreign bodies, such as pieces of iron, slate, stone, wood, etc., getting between the digits, and nails, wire, and sharp bodies are frequently found in the sole of the foot. Therefore, in all cases of lameness the foot should be carefully washed and the sole scraped and examined, and if foreign bodies are met with they must be removed, and the

foot put into a cold water and bran poultice for a day or two, keeping the poultice moist by dashing cold water over it three or four times a day.

203. **Foul in the Foot** consists of an irritative inflammation and ulceration between the digits, and is the most common foot affection in the cow, and usually caused by the animal standing in a filthy wet box or yard, or on soft, wet, marshy pastures; and although I have seen hundreds of cases, I have never yet met with one that could be said to arise from scrofulous or specific influence. There is acute lameness present, and the foot is swollen round the top of the hoof, and there is also a strong foetid smell, with ulcerated sores of the soft tissues between the digits. The worst cases have been caused by rough treatment and the application of strong caustics. and I must here strongly condemn the barbarously cruel treatment of pulling a rough rope between the toes and applying butyr of antimony. This latter dressing burns and destroys the parts, bringing on what is termed '*bastard fouds*.' I have on many occasions seen the bones laid bare with such brutal treatment. Simple soothing applications are all that are necessary. The *treatment* for foul in the foot is very simple. The beast should be removed to a clean, thoroughly dry box, the parts washed with cold water containing phenyle or some disinfectant, and dressed with carbolic oil and tow, and the foot poulticed for a day or two with bran and cold water, to which a tablespoonful of carbolic acid has been added. This in ordinary cases is all that is required. But when the ulceration is more extensive, and after the inflammation has been reduced with the poultice, the sores must be dressed with caustic powder (*par. 1060, No. VI.*), and a pledget of tow, smeared with the tar ointment (*par. 1072*), should be inserted and held in its place by a bandage put round the top of the foot and between the digits, like the figure of 8, this giving great support.

204. Ulcerations and damage of a very serious character are also caused by **Foot and Mouth Disease**. In many cases the bones are entirely bare through this disease, so that repairs to the damaged parts are most difficult to accomplish (*par. 464*). The treatment for it is similar to that for foul in the foot (*par. 203*).

205. **Laminitis.**—Founder, or inflammation of the sensitive tissues of the foot, although of frequent occurrence in the horse, is rarely seen in the cow, yet I have had several cases arising from the after-effects of difficult parturition; also from metastatic inflammation—*i.e.*, inflammation shifting from one part to another, as from the mammary gland to the feet. Unlike the horse, the patient is inclined to lie continually, while there is great difficulty in getting it on to its feet, when great pain is evinced, with but slight constitutional disturbance. *Treatment.*—Cold water poultices must be applied to the feet, and the antiseptic fever medicine (*par.* 1067, No. II.) given night and morning.

206. **Sore Feet.**—This is occasionally seen where cows have been driven long distances on a hard road—not so common nowadays as formerly. *Treatment.*—Wash the feet with some antiseptic wash (*par.* 1060, No. I.), cover the damaged part with a small portion of tar, and then turn the animal into a clean loose-box or good pasture. If great lameness is present, with heat in the foot, poultice for a day or two with cold water and bran.

207. **Interdigital Growths** (*fibromata*) are sometimes met with, and are mostly seen in front, at the top, and between the digits. When they get large they cause the claws to spread apart, and produce lameness. *Treatment.*—The animal must be cast, and the tumour cut out with a sharp knife, and the part dressed with antiseptic wool and tar ointment (*par.* 193), kept in place with figure of 8 bandage (*par.* 203).

208. **Overgrown Hoofs.**—Animals kept on soft litter, bulls in particular, are subject to this. The walls of the hoof grow, turn on to, and overlap the sole, while the toes get to great length. This overgrowth rarely or never causes lameness, yet interferes with the walking of the animal. All that is required is to shorten the toes with the **hoof-shears** (*Plate LIV.*, No. 2), then, with a rope over a beam, pull up the foot, and with a shoeing-knife dress off the overlapped wall from the sole.

### SHEEP.

209. The foot of the sheep in conformation is closely analogous to that of the cow.

210. **Foot Troubles and Disease in Sheep.**—Like cows, sheep are subject to foreign bodies getting fixed between the digits, to stabs or pricks in the sole of the foot, to ulceration from foot and mouth disease, to excoriation of the skin round the band of the hoof and between the claws, to excessive travelling on hard roads, and to inflammation of the blind duct or canal, found in the front of each sheep's foot. When lameness is observed, the foot should be carefully examined and dressed where required, as recommended for the cow (*par.* 203). The commonest ailment the feet of sheep are subject to is foot-rot.

211. **Foot-Rot in Sheep.**—An ulcerative disease of the feet of sheep of a highly inoculative character, and most frequently seen amongst heavy, well-bred, and well-fed sheep, folded on long luxuriant grasses and on soft, velvety turf. These take too little exercise to wear away the ground-surface of the crust of the hoof, which gets too long, turns round, overlaps and presses the sole, setting up inflammation and the formation of matter, sometimes at the band of the foot, at other times at the sole or between the digits. The matter formed separates the horn from the sensitive parts, when dirty-looking sores and sprouty growths are developed. Sheep affected with foot-rot should on no account be taken on to a farm or amongst a flock where the disease has never existed. I could relate case after case where the malady has been carried in this way. Some pastures are, however, more prone to the development of the disease than others, while on the bare rocky mountain slopes and the gritty sandy banks adjoining the sea the malady is seldom, if ever, seen.

212. *Treatment* for foot-rot is to first separate the lame sheep from the sound; next, have the lame ones turned up, and their feet examined and dressed every fifth or sixth day. All dead or broken horn should be carefully dressed off with a sharp knife,



being careful not to *cut too deep or make the part bleed* ; then the sores should be dressed with a strong solution of blue vitrol or crude carbolic acid, or a mixture of equal parts of the two, and the sheep so treated should be turned on to some sharp fallow for three or four hours every day. When the disease is very rife, and a large number of sheep are affected, a strong solution of sulphate of copper may be put into a trough, and the sheep driven through it every fourth or fifth day. **Arsenic** is also used in a similar way ; but I strongly advocate the spreading of crushed rock-salt to about 4 inches thick on the floor of a good-sized open shed or loose-box, and the animals being put in to paddle amongst it three or four hours every day. To prevent the occurrence of this complaint, the sheep ought to be turned on to some good sharp fallow for three or four hours daily.

### DOG.

213. The dog's foot differs very materially from that of the horse, cow, and sheep by having four toes and horny appendages, or claws ; with a fifth, or *dew-claw*, on the inner side of the leg, a little above the foot. Strange, this fifth appendage, or dew-claw, is found on the fore-leg of dogs of every class, but not often on the hind-limbs, the latter being mostly observed on curs, retrievers, and mongrel-bred dogs, and sometimes they are double. All sporting dogs, however, are, as a rule, exempt from them. These dew-claws are sometimes attached to the limb merely by the skin, or by a bony connexion. The ground-surface of the dog's foot is protected by five firm dense elastic pads, one under each toe and one at the back of the foot.

214. **Dew-Claws.**—These, when large, should be cut off the hind-legs, as they are of very little use, and apt to get torn, and cause troublesome sores ; they are readily removed by clipping them off with a pair of sharp scissors or bone forceps. Stop the bleeding with a pad of medicated cotton-wool and bandage, and leave this on for twenty-four hours ; then leave the wound to the antiseptic dressing of the dog's tongue.

215. **The Claws.**—Dogs that are petted, and pass the principal part of their time trotting about on carpets, have their claws growing

to such a length that in some cases the horny toe turns round and up, and penetrates the pad at the bottom of the foot, causing great pain, lameness, and inflammation. When this is observed, the feet should be put into warm water to soften the horn, and the extra growth of the nails clipped off with a pair of strong scissors or a pair of hand-spring pruning-shears.

216. **The Pads of the Foot** are subject to injuries from prods and cuts, with nails, thorns, glass, etc. The foot should be carefully examined, and if any foreign body is found it must be removed, and the parts washed with a solution of chinosol or izal. If much inflammation be present, put on a linseed meal poultice and muzzle the dog for twenty-four hours or more; then dress the wound with tincture of benzoin once or twice a day.

217. **The Interdigital Space** sometimes becomes excoriated and inflamed, and when this is seen, wash the feet with izal or chinosol solution night and morning, and dust the sores with a little fine powdered fuller's-earth.

218. **Sore Feet.**—At the beginning of the season, when the feet of sporting dogs are soft, they are apt to become tender and sore, in which case they should be well washed, cleared of all grit and dirt, and then dressed with oil of cloves, creosote, or tincture of iron; but as a rule the dog has more confidence in the antiseptic treatment of his own tongue, which generally answers much better than any application that may be used.

## PIG.

219. It is not often that veterinary aid is requested to examine and treat injuries and diseases of the feet of the pig; yet, like the cow and the sheep, foreign bodies, such as stones, bones, wood, and nails, occasionally become fixed between the digits, but, as a rule, these can be removed by the owner or his servant. When **foot and mouth disease** was rife, pigs were great sufferers from the malady, more particularly sucking-pigs, and when made to move it was pitiable to hear them scream and to see them pick up their feet.

The excoriation and ulceration round the top and between the digits were in many cases very extensive, and so severe was the pain that many died from sheer exhaustion. The *treatment* was clean dry bedding, with drachm doses of chlorate of potash in the food night and morning, for adult animals; also dressing the feet with antiseptic lotion, made with a weak solution of sulphate of zinc or sulphate of copper and carbolic acid, which was sprayed over the feet with a syringe twice a day.

## LECTURE V

# THE DIGESTIVE ORGANS

### PART I

220. As some of the organs of digestion of *non-ruminants*, and those of *ruminants*, present marked differences from one another, and the derangements and diseases to which they are subject are still more dissimilar, I shall deal with the stomach and bowels of each separately, while the accessory organs of digestion, with their diseases, will be considered in Part II.

### THE HORSE.

221. The digestive organs of the horse consist of—

(1) **The Mouth.**—This comprises the *lips*; the *cheeks*; the *hard palate*, or roof (*Plate XVII., No. 1*), which is in the form of ridges, or bars, running from side to side, between the upper molar teeth, with a longitudinal line in the middle; the *soft palate*, at the back of the mouth, a sort of dense curtain, hanging between the mouth and throat, which from its size does not allow the horse to breathe through the mouth; the *tongue*, and the *teeth*. Owing to the importance of the last named, they are specially dealt with in a separate lecture (Lecture VII., 'The Teeth'). The mouth is also lined by mucous membrane.

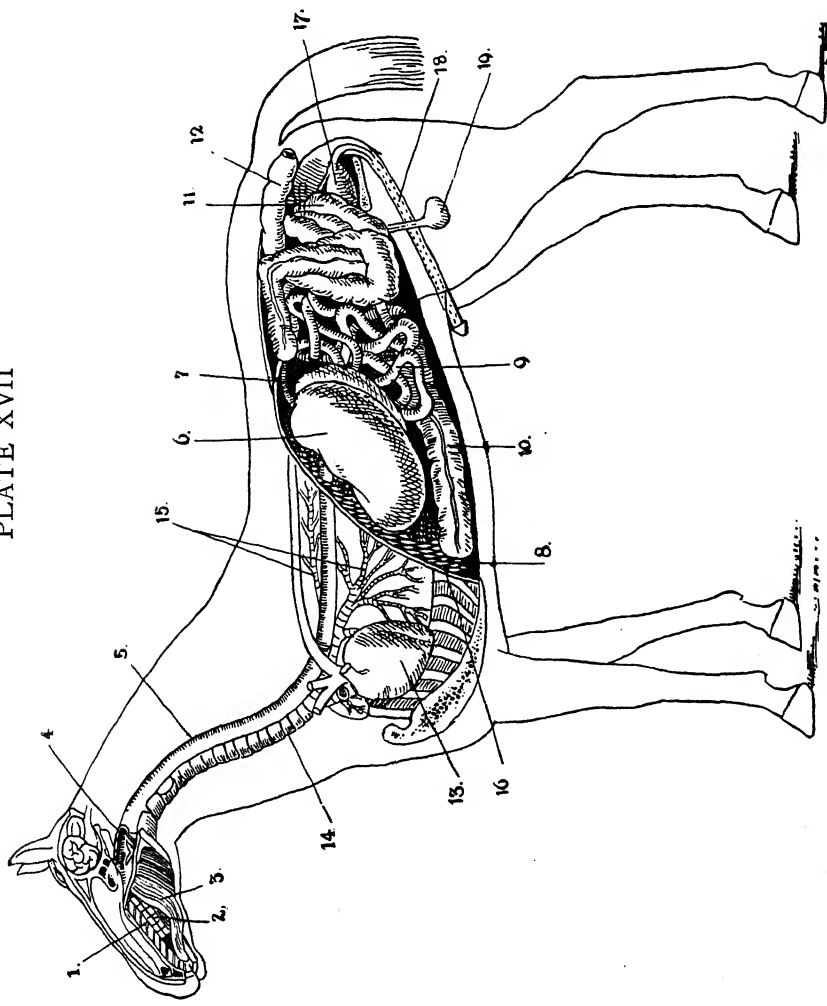
(2) **The Salivary Glands** (situated in the region of the mouth).—There are three pairs of these—namely, the *parotid glands* (*Plate XVIII., Fig. D*), just below each ear; the *sublingual*, underneath the tongue; and the *submaxillary* below, and within the angle of the lower

jaw. There is also situated, in the mucous lining of the mouth, the labial, buccal, and mucous glands.

- (3) **The Pharynx**, or throat (*Plate XVII., No. 4*).—This is a muscular tube lined by mucous membrane, and connects the mouth with the **œsophagus**.
- (4) **The Œsophagus**, or gullet (*Plate XVII., No. 5*).—This is the canal which leads from the throat to the stomach, is lined by mucous membrane, and the walls are made up of longitudinal and circular involuntary muscle and connective tissue.
- (5) **The Stomach** (*Plate XVII., No. 6*) is the connecting medium between the gullet and small intestine. It inclines to the left of the anterior portion of the abdominal cavity. The stomach of the horse is very small compared with the size of the animal, and greatly resembles a bagpipe in shape. It has *three coats*: outside **serous**; middle **muscular**, of three sections; and inside **mucous**, of two parts—*i.e.*, one white cuticular, resembling the surface skin, and connected with the opening of the gullet, which enters the stomach on the left side by the *cardiac orifice*; the other pale pink, villous, or velvety, on the right side of the stomach, and this is the true digestive portion, being continued into the small intestine by the opening termed the *pyloric orifice*.
- (6) **The Small Intestine of the Horse** (*Plate XVII., No. 9*).—This comprises the *duodenum*, 2 feet long; the *jejunum*, 30 feet long; and the *ileum*, 40 feet long. The total capacity of the small intestine is estimated to be about 11 gallons.
- (7) **The Large Intestine of the Horse** (*Plate XVII., Nos. 10, 11, and 12*).—This is divided into the *cæcum*, or blind gut (commonly called the *water-bag*), 3 feet

DIGESTIVE SYSTEM OF THE  
HORSE.

1. Roof of Mouth or Palate showing the Ridges.
2. Molar Teeth.
3. Tongue.
4. Pharynx.
5. Oesophagus or Gullet.
6. The Stomach.
7. Spleen.
8. Region of Liver.
9. Small Intestines.
10. Lower Portion of Colon.
11. Higher Portion of Colon.
12. Rectum.
13. The Heart.
14. Trachea.
15. Bronchial Tubes of the Lungs.
16. Diaphragm.
17. Bladder.
18. Penis.
19. Testicle.



long, having a capacity of 4 gallons; the *colons*, *large* and *floating*, 20 feet long, with a capacity of 12 gallons; and the *rectum*, which is the termination of the intestinal canal, 2 feet long, and with a capacity of 3 gallons. The estimated average length of a horse's intestines is 97 feet, and total capacity 30 gallons. Like the stomach, the walls of the intestines have three coats: the outside *serous*; the middle *muscular* (longitudinal and circular); and the inside, covered with *epithelium* and a *mucous* membrane, and well studded throughout with various glands.

222. Besides the above named, which are found, not only in the horse, but also in the pig and dog, and in a general sense also in cattle and sheep, there are also the accessory digestive organs, that perform functions which assist digestion—that is to say, they convert the food into such a state that it can be absorbed and taken into the blood and conveyed to the different parts of the system, to be assimilated for nourishment (see Lecture VIII., 'Circulation,' The Lymphatic System). Such accessory digestive organs are the **liver**, the **spleen**, the **pancreas**, or sweetbread, and the **portal vein**, all of which will be further noticed under the Digestive Organs, Part II.

223. **The Processes of Digestion** are as follows, and in the order given:

- (1) The food is taken into the mouth; in the horse it is gathered in by the mobility of the upper lip, called the prehensile property, when it is seized by the incisors, or front teeth.
- (2) It is then pushed between the back (molars) teeth by the tongue; the cheeks assist the tongue in keeping it there while it is masticated, or chewed, by these teeth.
- (3) During this process of **mastication** the salivary glands pour out *saliva* (an alkaline fluid secreted from the blood). This moistens the food, thus making it easier

## VETERINARY LECTURES

to swallow, and also acts chemically on a small proportion of the starchy matter, converting it into sugar by the action of a special ferment in the saliva.

- (4) The food, having been well masticated, is formed by the tongue and cheeks into a *bolus*, which is passed to the back of the mouth, where it is seized by the action of the muscles of the pharynx and pressed into the gullet, down which it is propelled by the progressive contraction of the involuntary muscular fibres of that canal into the stomach.
- (5) In the stomach it is mixed with **gastric juice**, a fluid of an acid character, which, again, acts chemically upon it. For the better accomplishment of the process, the food is being constantly rolled about, or 'churned,' by the action of the different muscular coats of this organ. The flesh-forming matters—albuminoid portions, or *proteids*—are here converted into the more soluble *peptones*, and a portion of the nutritive elements is absorbed and carried into the **portal vein**, and thence to the liver; while the rest of the food is converted into a soft-soap-like material called *chyme*.
- (6) **The Chyme** is next passed on into the small intestine. Here it is met by the **bile** (which the liver is constantly secreting), the **pancreatic juice**, or intestinal saliva (formed by the **pancreas**), and by the juices of the various small intestinal glands. The pancreatic juice, which is alkaline, and somewhat resembles saliva, has a powerful action on fats, converting them into such a form that they are capable of being absorbed, while the bile assists in the emulsification of the fats. The bile also appears to act as a natural purgative.
- (7) The different kinds of food having now been acted upon by the fluid secreted by the salivary glands and



stomach—*i.e.*, *saliva* and *gastric juice*, as well as by the *bile*, *pancreatic*, and *intestinal fluids*—the *chyme* is converted into a milky emulsion called **chyle**. While this process is going on, a portion of the new material is absorbed by the vessels of the intestines and carried to the portal vein, and so to the liver.

- (8) By the action of the muscular walls of the bowels the *chyle* is forced along the intestinal track, when numerous little bodies called **villi**, which are studded all over the lining membrane, select more of the available nutritive material, and this is carried by the lymphatic vessels into a receptacle lying under the backbone in the lumbar region, and called the **receptaculum chyli**; here it meets with other material absorbed from the posterior parts of the body, and, along with this, is carried by the **thoracic duct** into the blood by one of the **veins** (just before it enters the right side of the heart), and by means of the circulation of the blood is then distributed to all parts of the body.
- (9) The unabsorbed residue, being that which is indigestible, or in *excess of requirements*, passes along the intestines, and is expelled by the rectum as *feces*.

224. I may here mention that a horse should never be watered *after* feeding, as it has a very small stomach. It is generally believed that, if a feed of oats be given, and then a drink of water in close succession, the water will wash the oats in front of it right along the 72 feet of small intestines into the *cæcum*, or blind gut. The food has, therefore, no chance of being digested, consequently fermentation occurs. Whether this is so or not may be an open question; but from the smallness of the stomach there can be no hesitation in stating that a horse can drink more water at a time than would fill that organ, therefore it is a safe rule always to give water before feeding. In cold weather let the horse's drinking water stand indoors for some hours before use to take the 'chill' off, and then give from half to one pailful *before* its food.

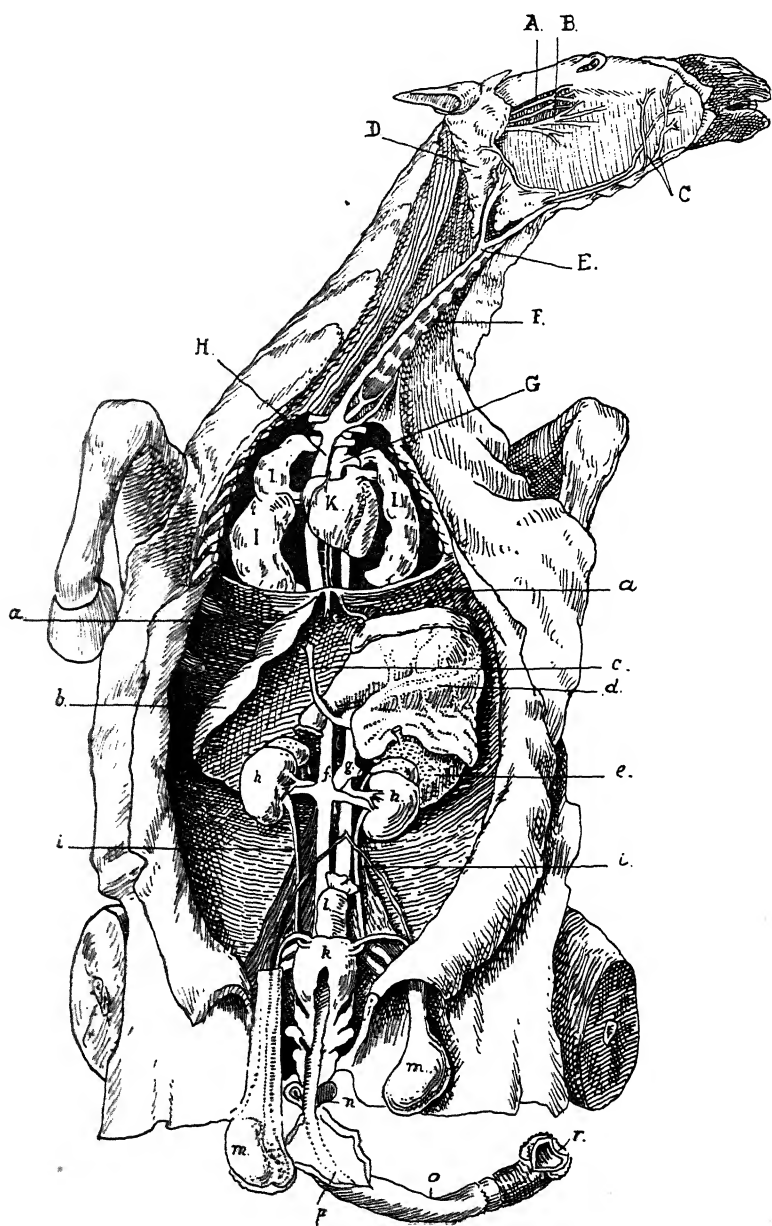
## INJURIES TO, AND DERANGEMENTS AND DISEASES OF, THE DIGESTIVE ORGANS.

225. **The Lips** of animals are liable to many injuries, such as being torn with nails, hooks, thorns, etc.; and are also subject to warts or angle-berries. These growths, if large, may be cut off with a knife or pair of scissors; if very small and numerous, an application of acetic acid twice a week, or an occasional smearing with treacle, will be found beneficial. The angles of the mouth are sometimes lacerated in the horse by the rough usage of the bit—for this, rest and the application of some antiseptic dressing is all that is required (*par. 1069, No. II.*).

226. **The Roof of the Mouth** is often also the seat of injury. In cows and dogs particularly pieces of turnip, wood, nails, leather, bones, tin, etc., are apt to become fixed here. The animal foams at the mouth, cannot feed, and loses flesh. When such symptoms are shown, a close examination should be made, and if there is a foreign body it should be removed at once. When a horse is casting its front teeth, or nippers, the gums and bars behind the upper teeth usually become swollen. It does not feed well, and is said to have got **lampas**, or, more commonly, '**lampers**.' Long ago a lamper iron used to be kept by blacksmiths. This was made red-hot, and the inflamed bars were burned; but it was a most unnecessary and cruel operation. The congested gums are only the natural effects of shedding the milk-teeth. If, however, the gums are very much swollen, a few slight cuts with a sharp knife across the bars, but not too deep, will give relief; and  $\frac{1}{2}$  ounce of saltpetre in a mash should be given every night for a week (see Lecture VII., '**The Teeth**').

227. **The Soft Palate** of the horse (or fleshy curtain which hangs behind the hard palate) is occasionally damaged, from various causes. For instance, it may get bruised when a ball is given on the sharp end of a stick, and this may cause troublesome abscesses. Balls should never be given on sticks. *Use the hand*, failing which, a balling-gun or a balling-iron may be used (*Plate LIV., No. I.*).

# PLATE XVIII



## EXPLANATION OF PLATE XVIII

### HORSE LAID OPEN, SHOWING—

- |   |                                      |
|---|--------------------------------------|
| A. Temporal Artery.                               | <i>c.</i> Bile Duct.                 |
| B. Branch of Facial Nerve.                        | <i>d.</i> The Stomach.               |
| C. Sub-maxillary Artery Vein and Parotid Duct.    | <i>e.</i> Spleen.                    |
| D. Parotid Gland.                                 | <i>f.</i> Posterior Aorta.           |
| E. Division of Jugular Vein.                      | <i>g.</i> Posterior Vena Cava.       |
| F. Trachea or Windpipe.                           | <i>h. h.</i> Right and Left Kidneys. |
| G. Aorta.   | <i>i. i.</i> Ureters.                |
| H. Anterior Vena Cava.                            | <i>k.</i> Bladder.                   |
| I. I. Lobes of Lungs—Three on Right; Two on Left. | <i>l.</i> Portion of the Rectum.     |
| K. The Heart.                                     | <i>m. m.</i> Testicles.              |
| <i>a. a.</i> The Diaphragm.                       | <i>n.</i> Cowper's Glands.           |
| <i>b.</i> Lobes of the Liver.                     | <i>o.</i> Penis.                     |
|   | <i>p.</i> Urethra laid open.         |
|   | <i>r.</i> Fossa in Glans Penis.      |

228. **Lower Jaw.**—The space between the corner nippers and the first molar teeth in young horses when being broken in to work is frequently injured by the use of a big heavy breaking-bit, particularly when the horse's head is bridled in too tight, and the bones at this part are in many cases so much damaged that pieces flake off—*exfoliate*—or have to be removed by an operation. The parts so injured must be dressed once a day with antiseptic lotion (*par.* 1069, No. III.), and the bit should be kept out of the mouth until the parts are healed. The lower jaw is occasionally fractured, and such an injury must be supported by plasters and splints, and the animal fed on thin gruel, hay-tea, and other slops, until union takes place. It is generally six or eight weeks before the animal can masticate solid food.

229. **The Tongue**, which in the horse is much broader at the point or apex than in the cow, has in all animals important functions to perform, being the organ of taste, and also helping the animal to swallow, etc. It is a fine, delicate, muscular organ, well supplied with nerves and extremely sensitive. It is very easily injured through ill-treatment whilst being handled by ignorant people, when it is liable to be torn, become paralyzed, and mortify; or it may even be pulled out. The entire horse 'Pickpocket,' for instance, had his tongue torn away while being given a ball. This happened on the groom taking hold of the tongue, when the horse reared up and left a large portion of the tongue in the man's hands. On two occasions I have had to cut about 4 inches off the end of the tongue of a horse through its being damaged—one being too much pulled on giving a ball, the other by putting on a twitch. In each case the member was partially paralyzed and hung out of the mouth, and was so much nipped and bitten by the front teeth—incisors—that it became quite black and mortified. It was cut off at the line of demarcation, and did well; but afterwards, on drinking, both animals plunged their heads up to the eyes in water before they could suck any up.

230. **Glossitis**, or inflammation of the tongue, may be due to injuries of various kinds, such as putting a twitch on the tongue—which ought never to be done—or giving strong medicinal agents,

undiluted. Inflammation of the tongue may also arise from some unforeseen cause; and I have seen this occur on several occasions, both in horse and cow, when the inflammation has been so extensive and the tongue so much swollen and so hard that the mouth was pressed open with the tongue protruding out of the front of the lips for 4 or 5 inches, while saliva ran from the mouth, and the animal breathed with great difficulty, being, in fact, so threatened with suffocation that tracheotomy had to be performed. These cases are, as a rule, not noticed until the disease is so far advanced that there is no chance of any successful treatment, for the mouth is so full with the swollen tongue that medicine cannot be administered. *Treatment.*—In such cases the tongue has to be scarified—that is, cut by plunging a lancet or a very sharp penknife into the protruding portion, and the mouth washed with boracic antiseptic lotion (*par. 1069, No. III.*), the lotion being injected into the mouth with an enema syringe, and suitable doses of nuclein hypodermically injected daily. The tongue, in many instances, also becomes hard or indurated from chronic inflammation of its substance, and when in this state has to be scarified with the lancet and dressed daily with tincture of iodine.

231. **The Frænum**—the guide or bridle of the tongue—is the membrane by which the tongue is attached to the lower jaw, and occasionally it is torn by the bit getting under the tongue, and being roughly pulled at by the rider or driver. I have seen some bad cases of this kind. *Treatment.*—Keep the bit out of the mouth until the parts are healed, and wash the mouth night and morning with the boracic acid lotion (*par. 1069, No. III.*).

232. **Ulcers** on the tongue are sometimes met with in the horse, and are generally due to injuries occasioned by the sharp edges or irregular wear of the teeth. Cows and sheep suffer from this even more than horses (see 'Digestive Organs,' Part II., Foot and Mouth Disease). *Treatment.*—Wash the mouth with the boracic acid lotion, and if the teeth are at fault, dress them with the tooth-rasp (*Plate XXXIII., Fig. 4.*).

233. **Dogs and Cats** frequently pick up needles and pins, or

sharp bones, which penetrate the tongue. The animal shows signs that something is wrong in the mouth by rubbing the floor with the cheeks, or poking the side of the face with the fore-paws, the saliva at the same time running from the mouth. When this is noticed, examine and remove the offending object. A common cause of injury to the tongues and mouths of horses and cattle is due to the administration of drugs, such as turpentine and ammonia, in un-

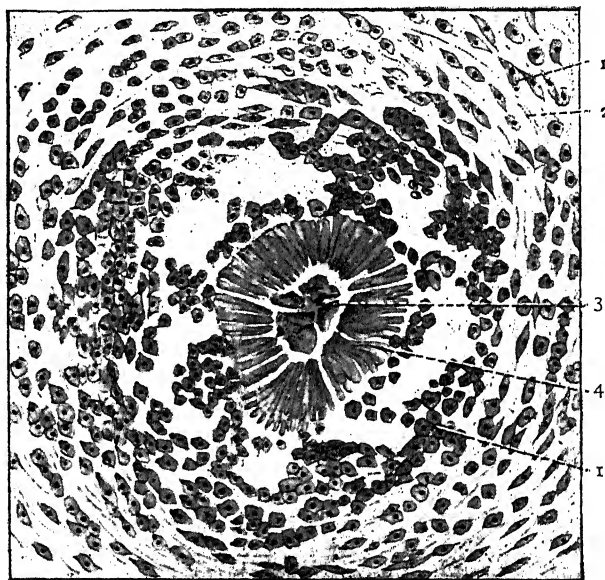


FIG. 3.—ACTINOMYCOSIS IN COW'S TONGUE.

- 1, 1. Cancerous cells.  
2. Fibrous tissue.

3. Nodules of Ray fungus.  
4. Radiating fibres of Ray fungus.

suitable vehicles. Turpentine should be given in linseed-oil, or, if oil is not handy, milk makes a good substitute, or it may be beaten up with eggs and water. *Never give turpentine in cold water*; but ammonia, on the other hand, should be diluted with plenty of *cold* water when administered. If strong ammonia has been administered by mistake, wash the mouth out with vinegar and water. Spirits, such as whisky, should always be diluted with the same quantity of cold water, for I have known of extensive injury having been done

to the mouth by giving raw spirits. The **tongues of horses and cattle** are often injured by thorns, pins, needles, bones, or broken teeth ; and are also affected by morbid growths, such as *actinomycosis*.

234. **Actinomycosis** (Ray fungus), a complaint which may be looked upon as a morbid change in the tissues of a part, due to the presence of a vegetable micro-organism—the Ray fungus—causing an enlargement, which is composed of numerous central nodules with radiating fibres, having a star-like appearance (*Fig. 3*). Cattle are apparently the most subject to the malady, although other domestic animals and human beings are not free from its influence. Any part of the body may be affected, yet the bones of the face, jaws, and tongue are mostly attacked. When the tongue is the seat of the disease, it is known as '*wooden tongue*'; while the term of '*lumpy jaw*,' or '*big jaw*,' is applied when the disease affects the jaw. It is thought that the complaint is caused by the animals eating rough fodder, such as barley-straw, the barbs of which lacerate the lining of the cheeks or the surface of the tongue, wherein the germic organisms find a suitable bed for their development. When the tongue of the animal is affected, and as the case progresses, the patient is found rolling that organ about, holding its nose slightly up when attempting to swallow, and seems to have great difficulty in getting the food passed between the molar teeth, or rolled about for mastication. Saliva also flows freely from the mouth, the patient loses flesh rapidly, but, as a rule, is not hide-bound ; and, on examining the mouth, the tongue is found to be very much enlarged and hard in places, causing considerable loss of power. When the bones of the face and jaws are attacked, the disease crawls on very slowly, and finally a large swelling is noticed on the side of the face or jaws, the surrounding tissues become implicated, and at times the complaint gets so far advanced before anything particular is noticed that the molar teeth are, on examination, found loose in their sockets, and can be easily removed with the fingers ; eventually offensive, filthy-looking, fistulous sores break out on the face, with a disagreeable discharge and large fungoid granulations.

235. *Treatment*.—Iodide of potassium, given in 2-drachm doses,



night and morning, in a pint of cold water, scarifying the tongue with a sharp knife, and applying tincture of iodine to the indurated parts, occasionally answers well. When the bones are affected, the iodine treatment is of little or no avail, and surgical interference is rarely beneficial. One peculiar case I had was a cow that was losing flesh very fast. Her lower jaw was constantly on the move, and the tongue was hanging partly out of the mouth as if paralyzed. Saliva flowed freely, and there was frothing round the lips, presenting, in fact, all the symptoms of something sticking amongst the teeth or in the tongue, or an attack of actinomycosis; but examination showed that neither was the case. At times she fed, but swallowed with great difficulty, never chewing the cud, and occasionally vomiting the food. I ordered her to be slaughtered, when a large darning-needle was found sticking in the passage between the second and third stomachs. Yet the animal neither swelled nor had any cough. Another case of a cow which showed similar symptoms was, on slaughtering, found to have actinomycosis of the second stomach, the walls of which were nearly one inch in thickness.

236. **Aphtha, or Thrush**—simple inflammation of the lining membrane of the mouth. Young calves and lambs are also subject to this complaint. On examining the mouth, sometimes numerous small **blebs**, or vesicles, are seen, filled with a thin watery fluid, which leave little white-looking ulcers when they burst. In other cases the mouth is very red and hot, with the mucous lining peeling off, and this prevents the young animals from sucking and feeding, while, in cases of the lamb, it sometimes affects the teats of the dam, and sets up inflammation of the udder. Thrush is generally thought to be due to some derangement of the digestive organs. *Treatment.*—For lambs, 2 scruples each of carbonate of magnesia, carbonate of soda, powdered rhubarb and powdered ginger, should be given in a little cold water night and morning; and for calves double the above dose may be given, also the mouth should be washed with the boracic lotion two or three times a day (*par. 1069, No. III.*). Further, place blocks of rock-salt on the pastures for the animals to lick, or in the manger for the calves.

237. **Stomatitis Pustulosa**—deep-seated inflammation and ulceration of the lining of the mouth and tongue, varying in degree. Young calves, five or six weeks after birth, also sheep and lambs, occasionally suffer from small enlargements, resembling carbuncles, which form on the tongue and on the inside of the cheeks, terminating in ulcers (*stomatitis ulcerosa*), with thick granular matter at the bottom of them. Occasionally the outside of the cheeks are enlarged, when a quantity of frothy saliva flows from the lips, and the little animal does badly. These enlargements are thought by many to be due to drinking too hot milk. On looking into the mouth, ulcers will be seen on the inside of the cheeks, corresponding with the enlargements on the outside. *Treatment*.—When the thick granular matter is seen, it should be scooped out, and the wounds dressed with tincture of iron and water, or tincture of iodine, or the boracic acid lotion, while 30 grains of chlorate of potash may be given with advantage in the milk night and morning; or tablespoonful doses of Parrish's food, which is recommended to be given once a day, with 2 tablespoonfuls of cod-liver oil. The external application of iodine ointment (*par. 1066, No. III.*) to the enlargements generally has good effect.

238. **Pharyngitis**, or inflammation of the lining of the throat, may arise from a variety of causes, as injuries from foreign bodies or from a severe cold. When the throat becomes much congested and inflamed, the animal is unable to swallow, and, on attempting to drink water, a portion is returned through the nostrils. If the inflammation is at all persistent, the chances are that the horse will ultimately become a 'roarer.' In very severe cases, where the effusion, or œdema, has so swelled the inside of the throat that there is a danger of asphyxia, *tracheotomy* has to be performed. This is done by cutting out a portion of two rings of the windpipe in front, and inserting a tube suitable to the size of the animal. *Treatment*.—In cases of a mild character, stimulating embrocations, or mild blisters (*par. 1066, No. I*) may be applied round the throat, from the root of one ear to the root of the other, and 3-drachm doses of chlorate of potash, with 2 tablespoonfuls of treacle, should

be given in a sloppy mash of bran night and morning. Some years ago I had a very severe case, which had been under the care of an unqualified man, who treated it for influenza. On examination, I found a large thorn, composed of three branches, the middle one about 10 inches long, and the two shorter ones each about 7 inches in length, sticking in the throat. This I pulled out, after it had been there three weeks; but the animal eventually turned a 'roarer,' when I performed *tracheotomy*. The horse wore the tube, and worked daily in a miller's cart for over twenty years.

239. **Postpharyngeal Abscesses**—the formation of matter or pus at the back of the throat. Cattle suffer very much from these scrofulous or tubercular abscesses. They cause the animal to make a great noise—a kind of snoring—in the breathing, so much so at times that *tracheotomy* has to be performed, thus allowing free respiration until the abscess is ready to open, which may be done through the mouth. I have operated on a number of these cases through the mouth with the small-finger embryotomy knife. As soon as the patient is better, it should be fattened right away and sent to the butcher. Tumours with long necks—*polypi*—are also found in the throat, producing somewhat similar symptoms to the abscesses just described, but they are readily twisted out by the hand.

240. **Choking**.—Partial or total obstruction of the gullet. Some horses, especially those that are greedy feeders—if the corn is not carefully spread out on the bottom of the manger—will take too big a mouthful and choke themselves. Sometimes a piece of turnip or potato sticks in the gullet, but this is very rare in the horse. The symptoms of choking in the horse are rather peculiar; the animal stands in a crouching position, with the hind-legs forward under the belly, while the head and neck are extended, and saliva flows from the mouth; the nose is pointed up and straight out, with the back of the head seemingly pulled backward and down, giving a remarkable convexity to the lower portion of the neck. The action of the muscles of the neck every now and again gives the impression that the patient is trying to eject the lodgment, and the horse occasionally gives a peculiar scream and falls down on the knees (*Fig. 4*). In

this case, all that can be reached by the hand must be removed, and the animal given a drench of warm water and skim milk mixed, or, better still, thin oatmeal gruel, which induces the action of the gullet, the gruel to be put through a milk strainer or muslin. Should this not succeed, the small end of the probang must be passed with great care. The injection of a dose of arecoline hydrobromide under the skin causes excessive salivation and foaming at the mouth, when, in some cases, the obstruction passes down into the stomach. Arecoline

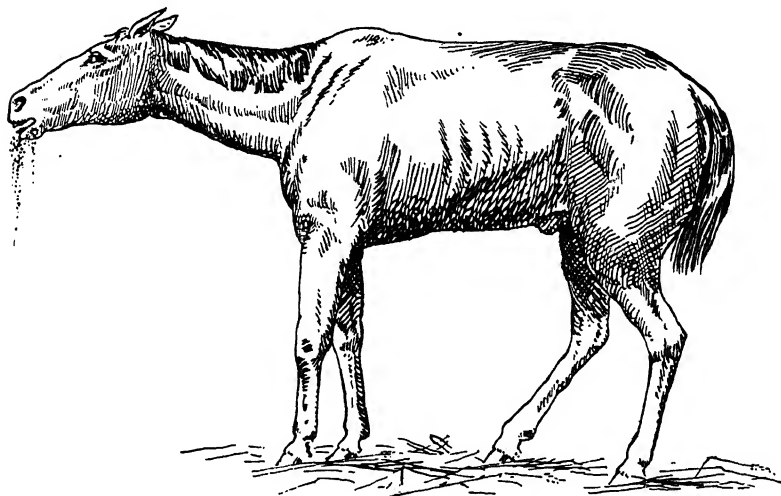


FIG. 4.—CHOKING.

can also be used for cows. Cattle, however, are more subject to choking than horses. They foam at the mouth and soon begin to swell up on the left side, switching the tail and stamping the feet, and this action is accompanied by diarrhoea. *Treatment.*—If the obstruction—usually a potato or turnip—can be felt, an attempt should be made to work the foreign substance up again into the mouth by putting one arm round the cow's neck and, with the fingers on each side of the gullet below the offending body, pressing it firmly and forcibly into the mouth. If this method does not succeed, and the object cannot be withdrawn by the hand, the turnip-rope may be used. This should always be done very care-

fully and not in a hurry, especially if the animal resists. Should there be a quantity of gas in the stomach and the patient much swollen it may die a mechanical death, owing to the pressure of the gas on the diaphragm, the lungs, and heart, before it can be relieved. If there is any likelihood of this happening, the stomach must be punctured so as to liberate the gas. This may be done with a *trocár* and *cannula* (Plate LIV., Fig. 6), or, in extreme cases, even with a knife, by plunging it into the stomach half-way between the last rib and the haunch bone on the left side, then turning it crosswise, when the gas will rush out. A little treacle and brown paper placed over the opening in the side as soon as the knife is withdrawn is all that is required for the wound made, and it is seldom that any bad effects follow. I have met with cases where the offending body has dropped into the stomach after the pressure of the gas was removed.

241. The **Œsophagus, or Gullet**, is subject to injuries and derangements: the former may be caused by pins, needles, thorns, and other foreign bodies; the latter by strictures, dilatation, or the formation of tubercular growths. All these have a tendency, particularly in the cow, to cause periodical swellings (*hoven*) on the left side similar to that seen in choking. Stricture is a contraction of the muscular walls of the gullet, and is sometimes met with in the horse and cow. Dilatation, or distension of the gullet, also occasionally affects these two animals, and may be due to paralysis of the muscular coat. In some cases of dilatation a pouch or pocket is formed, and known as 'diverticula,' and is a very serious form. All the above produce analogous symptoms to those of choking, and are very difficult to diagnose, while treatment is very unsatisfactory; the probang or turnip-rope may, however, be passed occasionally.

242. **Derangement of the Stomach** of the horse arises from many causes, such as injudicious feeding or overfeeding with too much badly-cooked food, as, for example, boiled wheat and barley, neither of which should be left to cool and then warmed up again—a common and very dangerous practice with many—as it turns sour and ferments. Wheat and barley should always be used newly

boiled. Another cause of stomach derangement arises from the animal bolting the food without chewing it, thus preventing the food being properly mixed with the salivary secretions, and, consequently, fermentation or generation of gases takes place, which may even distend the stomach till it ruptures. Colicky, griping pains may be present; but occasionally cases are met with when no such symptoms are shown, the animal standing quite still, hanging its head, blowing fast, and having its stomach greatly distended. If this is not quickly relieved, the mechanical pressure of the gas may cause death by suffocation. *Treatment.*—In such cases, at the commencement, 1 or 2 ounces of bicarbonate of soda should be given in a pint of water with  $\frac{1}{2}$  pint of whisky—this may neutralize the gas and give the stomach a fillip as well—or 2 to 4 ounces of hyposulphite of soda dissolved in 1 pint of cold water, given with 2 ounces of tincture of ginger, has a good effect. Should this not give relief, then the gas will have to be drawn off with a fine *trocar* and *cannula* (*Plate LIV.*, *No. 5*), which has to be passed in on either side (preferably the right) between the last rib and haunch. On the *trocar* being removed the gas escapes through the *cannula*, giving instantaneous relief. This operation should be done by a professional man. A ball composed of 3 drachms of Barbadoes aloes, 2 drachms of carbonate of soda, and 2 drachms of powdered rhubarb, can also be given.

**243. Rupture of the Stomach**—a rent or tear in the walls of the stomach. This fatal lesion is occasionally the result of some of the causes named in the preceding paragraph, and may take place with or without inflammation. In old subjects it is thought to be due to degeneration of the walls of the stomach; but one of the principal causes is when the stomach is much distended with gas from fermentation of the food and the patient throws itself about, as in colic. When the rupture takes place, there is a sudden and great prostration of the animal, breathing is short and quick, nostrils are dilated, a cold, clammy perspiration bedews the body, accompanied by trembling and quivering of the muscles, particularly of the limbs, heavy sighs, and seeming fear to move; in fact, the animal stands obstinately until it drops and dies. Sometimes

volumes of gas are to be seen regurgitating up the gullet towards the mouth, and in some cases there is an attempt to vomit; but I have met with cases where both regurgitation of gas and vomiting have been seen without any rupture, and the cases have recovered. When rupture takes place nothing can be done; the great point is to try to prevent it. First and foremost try judicious feeding, then, when cases of intestinal disturbance, with colicky pains and gas distension of the belly, are observed, lose no time in getting the patient relieved by administering the medicinal agents named in *pars. 242 and 249 (also par. 1062, No. II.)*.

**244. Stomach Staggers in the Horse.**—A disorder of the stomach accompanied by nervous derangement. In hot, dry weather, more particularly on hilly ground, where there is a second year's growth of rye grass, the horse is sometimes attacked with this malady. As in cattle suffering from the same complaint, too early ripening or aborting of rye grass is supposed to be the cause. The horse has an unsteady gait as if about to fall, first on one side and then on the other, swinging its head backwards and forwards. If in the stable, it may be found with its nose pressed on the bottom of the manger and forehead against the wall, or steadying itself with the nose fixed between the bars of the hay-rack. The breathing is slow and laboured, and the pulse full and slow. With its simple, single stomach, the horse is much better to treat than the cow. *Treatment.*—From 4 to 6 quarts of blood may be taken to relieve the acute symptoms, which, with a 4 to 6 drachm dose of aloes (*par. 1070, No. I.*), usually sets matters right. (For treatment of cow, see Part II., *par. 304.*)

**245. Indigestion**—imperfect digestion of the food, generally due to injudicious or over feeding, and common both in horses and cattle, particularly in the former, when being fed up for shows or for the market. The horse shows no pain, but simply loses its appetite. *Treatment.*—Give 3 drachms of aloes, with 3 drachms of bicarbonate of soda, in the form of a ball, when, if the animal does not pick up, mineral and vegetable tonics may be resorted to (*par. 1073, No. IV.*). In one case which came under my care the

horse had been given all sorts of tonic medicine without any good effect, and finally selected for itself the young shoots of thorn-trees, eating these with a great relish, whilst it would take no other food unless mixed with these. They were evidently just the fillip the stomach was in need of, the tannic acid contained in the thorn being the very thing Nature required. Since that time, in the spring and summer months, I have used them with great success, chopping them up, and giving them mixed with dry oats and bran. In other cases the animals will fancy the green parts of gorse (common whins); and in winter or early spring, when an animal—the horse in particular—is slowly recovering from some debilitating complaint, such as influenza, etc., and very shy about taking its food, whins chopped up and mixed with its food answers splendidly, or a good stem, cut with a quantity of bushy sprigs on it, hung up in the box for the animal to pick at when inclined, will induce a sickly horse to eat when all other things have failed. Another form of indigestion is due to an excess of acidity in the stomach, being more common in young foals and calves than adult animals. This particular form of indigestion is known by the names of 'pica' or 'licking complaint,' owing to the subjects licking the walls, eating soil, bones, stones, etc. As treatment for young stock, giving lime-water or carbonate of soda in the milk answers splendidly; for adult animals, change the diet, and give  $\frac{1}{2}$ -ounce doses of carbonate of soda night and morning in the food.

246. **Crib-Biting** is when the horse gets hold of the side of the crib, the bar of a gate, or any other handy object, with its teeth, and, by arching its neck, gulps in air, the while making a peculiar noise, and filling the stomach with wind. This habit is often due, in the first instance, to idleness, or a form of dyspepsia. The front portions of the incisor teeth of horses with this habit get gradually worn round; but this is also seen in horses that bite at the manger or stall on being groomed. The best remedy I know of is to use the new iron fittings (made by Musgraves, Belfast), in which the front of the crib is of iron, and too broad for the horse to get a hold of. Brick troughs with a broad mould on the top, a strap round the



neck, or feeding the animal from the ground, are all useful, and worthy of a trial.

247. **Wind-Sucking** in the horse is a similar complaint to **crib-biting**, and is also a bad habit. To test a horse for wind-sucking the following can be tried: Put a handful of soft sugar into the animal's mouth and leave it for ten minutes or so. If a wind-sucker, you will generally find it standing with its nose elevated, its neck strangely arched, and making a peculiar and distinctly characteristic noise; or the tongue may be noticed curled and protruding in front of the lips, and the animal sucking for dear life. Some horses only show the habit when a sloppy mash is given to them, when they suck in the air with the mash, making a peculiar noise. Crib-biting and wind-sucking are both considered as unsoundness.

248. **Ulceration of the Stomach** is happily rare, and when it occurs there are no positive symptoms. The horse does not vomit in such cases as does a human being, but drops off its food; it loses flesh, shows no pain, becomes hide-bound, with a staring, dirty coat, is languid, and finally dies. *Treatment* is of little use. Sub-nitrate of bismuth may be given night and morning in 2-drachm doses with vegetable tonics; or 25-drop doses of strong hydrochloric acid in 1 pint of cold water night and morning can be tried. I have seen three cases, but they did no good under treatment.

249. **Gastritis**, or inflammation of the stomach, may arise from a variety of causes, such as eating rough, coarse, indigestible food, and from the effect of mineral poisons, such as arsenic or mercurial salts; or it may be induced by drinking water charged with free sulphuric acid, sulphate of iron, or strong alkalies, or by feeding on mouldy grain; while at other times it is due to worms and bots. It usually proves fatal in a very short time. The horse shows great pain, lying down, rolling about, and perspiring freely, with no intervals of rest; the nostrils dilate widely and are red inside; the under side of the eyelid is also dark red; the breathing is fast and heavy; whilst there is an anxious look in the face. The animal soon becomes exhausted, trembles all over, with cold, clammy

sweats, and finally drops and dies. *Treatment*.—To relieve the pain, 4 ounces of laudanum in a pint of linseed oil may be given at once; blankets wrung out of hot water should be rolled round the body, with a piece of stair-carpeting wound above them, or a good application of mustard and water to the belly. But professional advice ought to be sent for at the very onset, as injections of 60 to 80 drop doses of morphia and atropine under the skin are very beneficial in this complaint.

250. If the inflammation and subsequent death is due to a **mineral poison**, such as arsenic, or to **strong mineral acids**, or to **alkaline poison**, the post-mortem shows the inside of the stomach raised up, swollen, and of a ripe red-plum colour; ulcerations may also be present, whilst the pain evinced during life will have been excruciating and acute. But when it is due to the **fungi** of mouldy grain the pain is slight, with occasional colicky pains and a quick, small pulse. The horse in these cases sometimes lingers on for days in a dull, listless, sickly fashion, occasionally affected with partial paralysis. The post-mortem exhibits patches of congestive inflammation of the stomach and of the intestinal canal. In **vegetable poisoning**, such as from eating rhododendron, yew, etc., the half-dried twigs of which are more dangerous than the green growing branches, the animal exhibits little or no pain, but suffers greatly from sickness, accompanied by coma, whilst death is very sudden. *Treatment*.—Give  $\frac{1}{2}$ -pint doses of brandy mixed in 1 to 2 quarts of hot, strong coffee; or a tablespoonful of carbonate of soda and 1 wine-glassful of aromatic spirits of ammonia given in 1 pint of cold water every five or six hours, and followed up by an occasional dose of raw linseed oil. The post-mortem in cases of vegetable poisoning reveals the lining of the stomach to be much paler than normal, without any signs of inflammation, unless the plants are of an acrid nature, when congestive inflammatory patches are seen. Further reference is made to vegetable poisoning in *par.* 303.

251. **Bots** (*Plate XL., Nos. 7, 8, and 9*) are the larvæ or grubs of a species of the gad-fly, the *Gastrophilus* of the horse (*Estrus equi*), of the order Diptera, or two-winged insect, the breeze or horse bot.

The bots, when seen in the stomach of the horse, are of a reddish-brick colour and about  $\frac{1}{8}$  of an inch long, made up in segments or rings with serrated borders, and are found in clusters varying in number from eight to ten up to between two and three hundred (*Fig. 5*). The section of the stomach from which the photo was

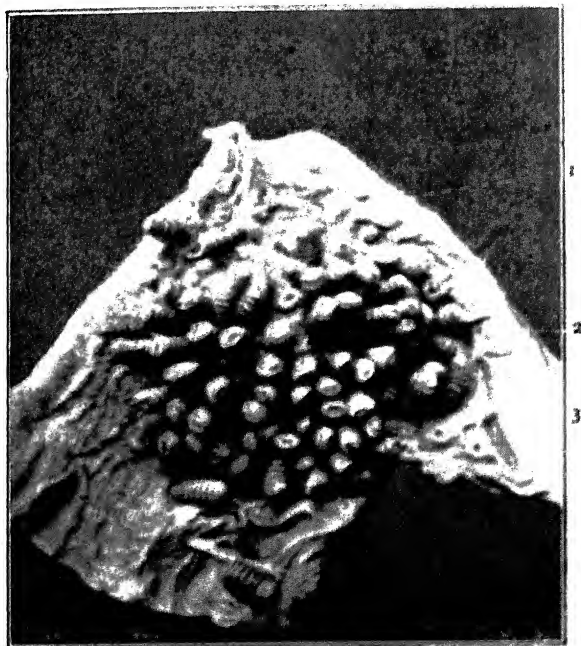


FIG. 5.—BOTS IN HORSE'S STOMACH.

1. Cuticular coat of stomach.
2. Cluster of bots (total number 203).
3. Orifices left in stomach where bots have fallen off.

taken had 203 bots attached to its lining, and was taken from a one-year-old cart colt, the animal having died from eating a large quantity of sand and soil, which had collected in the large intestine, the irritation of which induced inflammation of the feet (*laminitis*), and finally death of the patient. The morbid appetite was no doubt caused by the presence of such a large number of bots as were found in the stomach. In the year 1797 Bracy Clark, a noted veterinary

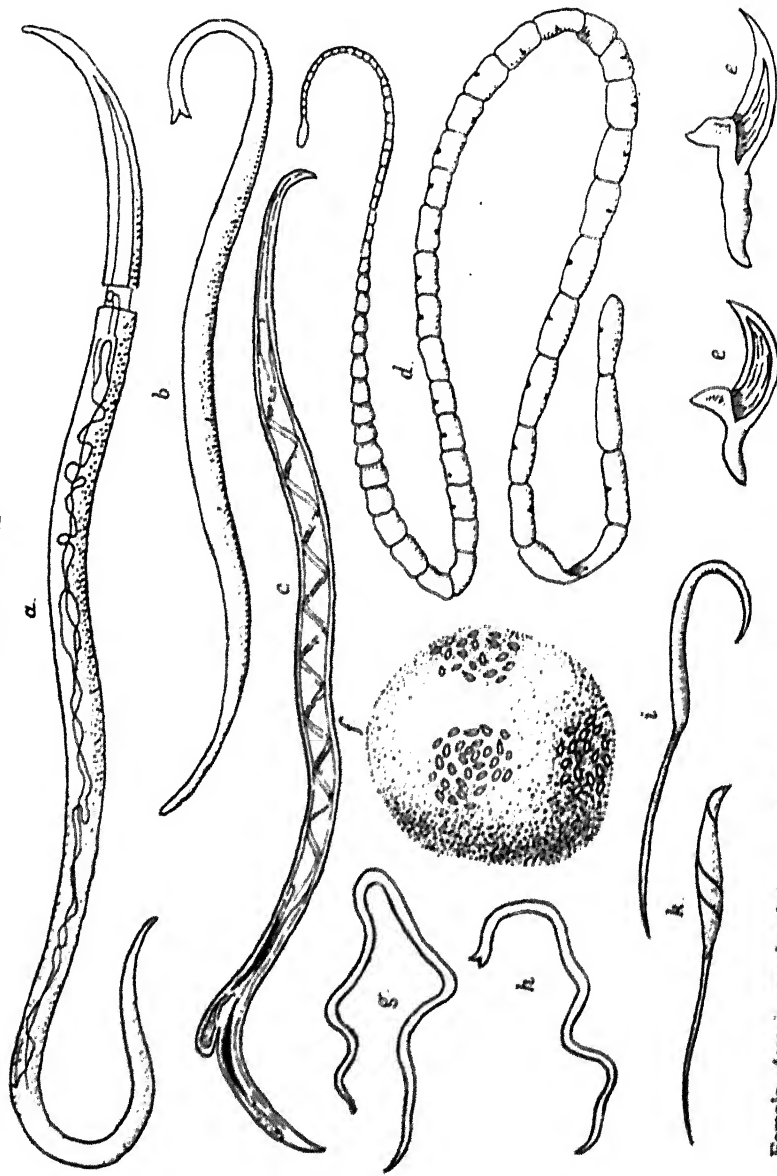
surgeon, gave a splendid account of the life-history of the *Gestrus equi*, or horse bot, which differs very little from what is known to-day. The perfect female insect resembles, both in size and colour, the humble-bee, with the exception that it has only two wings instead of four; it is provided with an egg-laying tube (ovipositor), which is carried under the body in a curved position, and about July or August, when the horses are working or grazing in the fields, the female insect is buzzing about the animals, and depositing its eggs on the shoulders and fore-legs, but more particularly behind the knee-joints, where the eggs—tiny yellow bodies—are seen sticking tenaciously to the hairs in clusters. The eggs when first dropped are covered with a gelatinous material, which glues them to the particular hair on which they are deposited. By the heat of the body of the horse combined with the rays of the sun these tiny eggs are hatched, causing an itching sensation at the roots of the hairs on which they are fixed, and in consequence of this the horse licks the parts with his tongue, when the newly-hatched embryos are carried by the tongue into the mouth, from whence they readily pass along the gullet to the stomach, and with their two little hook-like processes (tentacles) attach themselves to the cuticular or non-sensitive lining on the left or cardiac side of the stomach, where they remain from about July or August until the following May or June. The stomach of the horse is their natural habitat or winter-quarters for their development and growth during the larval stage. When spring comes again, they loosen their hold, pass away with the feces, and fall upon the ground, when they turn into *chrysalides*, or the third stage, which occupies about four or five weeks, and in due course of time form the perfect fly (*Gestrus equi*), ready to perform another circular tour. A large number and variety of medicines have from time to time been tried, yet there is no real known remedy for bots. They seldom cause the death of a horse, as nature thickens the coats of that part of the stomach to which they are attached, so that they cannot get through. Sometimes, however, after leaving the stomach, and in their passage through the intestines, they attach themselves to the lining membrane, and set up irritation and inflammation of the bowels, and cause the death of the horse. When present in large

numbers, and attached to the inner coat of the stomach, they, however, cause the horse to lose flesh greatly during the winter and spring months, and, as already stated, cause a morbid appetite. When the bots are fully developed, they seem to realize by their natural instinct that it is time for their next transformation—that is, into *chrysalides*—to take place, and begin to lose their hold and pass out of the body, and to assist them in this process nothing beats a feed of fresh grass in early spring. Three handfuls of tansy put into 1 quart of water and boiled down to 3 gills, then strained and given as a drench, acts well as a remedy for bots. (For Symptoms and Treatment, see *par.* 253.) The best preventive to be adopted is to run a horse-singeing lamp over the legs and shoulders of the horse in harvest-time, as soon as the little tenacious yellow spots are seen.

252. **Worms.**—Parasites found infesting the various organs and parts of the bodies of domestic animals may be said to be legion. For a full description of the different kinds, their names, habits, size, form, etc., Dr. Fleming's translation of **Neumann's** 'Parasites and Parasitic Diseases of Domesticated Animals' can be consulted with interest. Some of the most common worms found in the intestines of the horse are the **Nematoda**, or round worms. The common parasites are: (1) The *Ascaris megaloccephala* (*Ascaris lumbricoides*), a large round white worm, varying from 7 to 16 inches long, found in the stomach and small intestine. It is also common to the ass and mule. (2) *Oxyuris corvula*, a small curved worm, from 1½ to 2 inches long, thick and curved at the front, with a fine pointed tail, found in the large intestine, and generally known as the *mane-worm*. (3) The *Strongylus armatus*, or armed strongyle, a straight worm, in length from 1 to 2 inches, although mostly found coiled up in the walls of the large intestine—*cæcum* and *colon*—and in the intestinal canal, it is also found in the bloodvessels, scrotum, etc., and is one of the most numerous of the parasites found in the horse. (4) *Strongylus tetracanthus*, a spindle-shaped worm, varying in size up to 1½ inches in length, and found embedded in the mucous membrane of the intestinal canal (*Plate XIX.*).

253. Any one or a combination of the above-named worms may

# PLATE XIX



a. Female *Ascaris megalocephala*. b. Male *Ascaris megalocephala*. c. Female *Strongylus vulgaris*. d. Female  
*Strongylus vulgaris*. e. f. Hooks of the Tape-Worm. g. Head of Tape-Worm showing white dots of  
 h. Male *Strongylus fiaria* of Sheep. i. *Strongylus cartula*. k. *Oxyuris equi*.

be present in large quantities in the alimentary canal without causing any disturbance or derangement to the system, and without any external sign to denote their presence ; but when really very numerous they cause great emaciation, particularly during the winter and early spring months, when the following symptoms may be noticed : Staring coat, irregular appetite, dulness, languor, legs trailed on moving, belly tucked up, with occasional diarrhœa, and a great loss of flesh. If, on examination, nothing can be found to account for the poor anæmic condition of the horse, it may be concluded that worms are the cause, more particularly if the animal has been out grazing on an unsound pasture, or if the autumn months have been wet. **Tape-worms** are rarely found in the horse. *Treatment.*—Two ounces of turpentine mixed with 1 pint of linseed oil can be given every seventh or eighth day until four doses are given, and in the interval give every other night in the food one tablespoonful each of flowers of sulphur and common salt, and 1 drachm of sulphate of iron (*par. 1074, No. II.*). Good nutritious food, such as boiled barley and bran, eggs and milk mixed, also linseed jellies, should be given, with milk to drink. The strength must be kept up by nutritious and easily digestible foods.

254. From personal observation, I am led to hold the opinion that the ova or eggs from which some of these parasites are developed are deposited on the ground, along with the dung, during the summer months, and that they undergo some transformation outside of the body of the host, in which they are fully developed. For after wet seasons horses out at grass during August and September are generally found affected with worms and parasites, which show their effects in winter and early spring. November is, therefore, the proper time to treat such cases, before they become too well developed. One tablespoonful each of flowers of sulphur and common salt should be given in a mash of oats and bran once every day every alternate fortnight, both in the stable and at grass during the winter months. The land on which the animals pasture should be dressed with roughly crushed rock-salt—say, 8 to 10 hundredweight per acre. Although salt is the best and safest germicide we have in

nature, not nearly enough of it is applied to the land. Every year the above quantity, at least, should be put on the grazing land, lea ground, and the meadows. This will not only check parasitic diseases in horses and cattle, but will also prevent many of the insect ravages



FIG. 6.—TUBERCULAR SPLEEN OF HORSE.

1, 1, 1. Spleen.

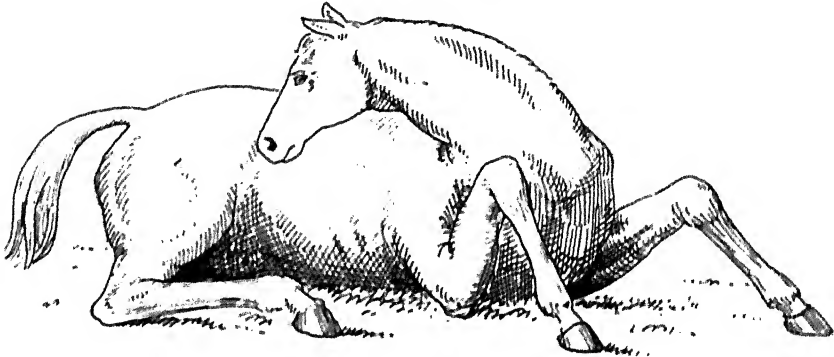
2, 2, 2, 2. Tubercular deposits.

and diseases of crops—as, for example, anbury or club root in turnips. But to do good, a *continued annual application is required*.

255. Colic (Plate XX. A).—Pure and simple colic may be defined as a severe crampy pain in the belly, and is classed under three different heads—viz., **spasmodic**, **flatulent**, and the two combined, or **spasmo-flatulent**. The majority of complications found in connexion with the abdominal organs are, however, accompanied

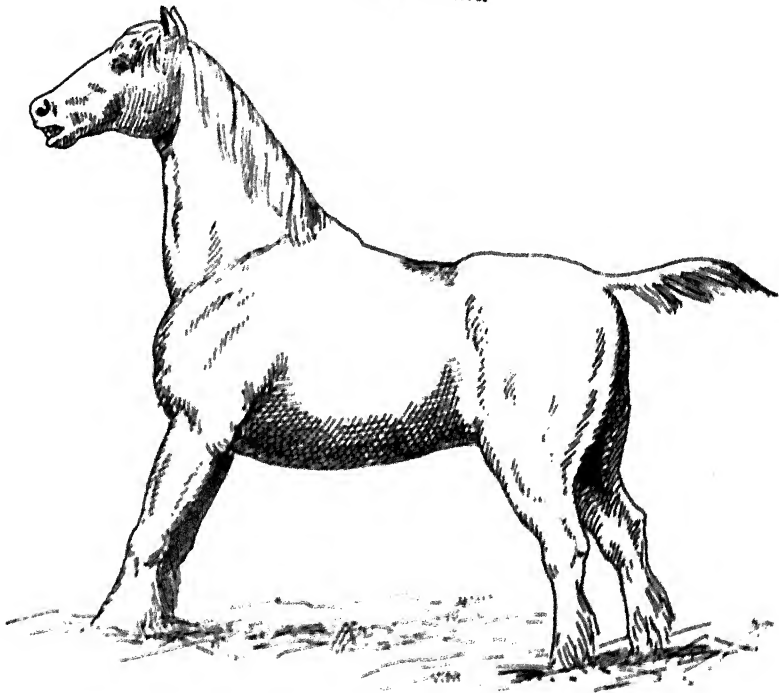


PLATE XX



A

Horse in Colic.



B

Case of Obstruction of the Bowels from Calculus in Large Colon.

more or less by colicky pains. **Spasmodic colic** proper is due to spasm or cramp of the muscular coat of the intestines, more particularly the small intestine. It arises from a variety of causes, such as drinking cold water when the animal is heated, improper food, such as wet grass, roots, worms, sudden chills, tumours, etc. (*Figs. 6 and 7*). This was taken from a photo of a portion of the mesentery or net of a five-year-old cart gelding which died from rupture of the stomach. The animal was for about eighteen months prior to death subject to periodical attacks of colic at intervals of five or six weeks, the pains varying both in severity and duration. The animal was always in good condition. The tumours shown on the diagram are tubercular, and very unique in the horse. When first attacked, the horse wriggles the body from side to side, sniffs the ground, paws with its fore-feet, cringes on its hind-legs, bends its knees, and then throws itself down, rolls about, balances itself on its back, perspires freely, and looks back at its side, and at times sits on its haunches like a dog. This may go on for a few minutes or half an hour, when the pain leaves the animal for an interval, and it stands or lies perfectly quiet. In a short time, however, the pain returns again. No time must be lost in getting relief, as injury sometimes follows by the horse knocking itself about; or the spasm, if severe, may eventually terminate in a loop or knot in the bowel, or it may be telescoped, from excessive contraction of the longitudinal and circular muscular fibres of the intestine. *Treatment*.—From 2 to 4 ounces of laudanum, along with 2 ounces of turpentine, in a pint of linseed oil, may be given at once, and if no abatement is noticeable, repeat half the quantity of laudanum and oil in half an hour, or give ball (*par. 1062, No. II.*) Apply hot-water blankets or mustard-and-water to the belly, and give warm-water injections. Bleeding, to the extent of 6 to 8 quarts, has in some cases a very beneficial effect, but do not be too long in getting professional assistance, for hypodermic injections of morphia and atropine are here again of the greatest service (*par. 259*). A dose of arecoline hydrobromide may also be injected under the skin with advantage.

generated from the fermentation of food, and occurs principally in the large intestine. The symptoms greatly resemble those of spasmodic colic, but, in addition, the animal is much swollen. If it is in great pain, a similar draught to that described under Spasmodic Colic may be given, and tobacco injections thrown into the rectum



FIG. 7.—TUBERCULAR MESENTERY OF HORSE.

- 1. Portion of small intestine.
- 2. Mesentery.
- 3, 3, 3. Tubercular deposits.

(Unroll from 8 to 10 inches of twist tobacco, and put in a quart of boiling water, strain, and when as warm as new milk—i.e., 98° to 100° F.—give as an enema.) If this does not give relief veterinary aid should at once be summoned, when possibly the intestine may have to be punctured to allow the gas to escape, as in *par.* 24. Sometimes 2 ounces of bicarbonate of soda in a pint of water, with  $\frac{1}{4}$  pint of whisky, is found to answer well when the animal

not much pained, or ball (*par. 1062, No. II.*). Both flatulent and spasmodic colic, if not attended to, may run on and terminate in enteritis or fatally from rupture of the stomach or bowel.

257. **Enteritis**, or inflammation of the bowels, is, as a rule, a very fatal disease in the horse, death frequently taking place in five



FIG. 8. STRANGULATED INTESTINE OF HORSE.

1. Neck of tumour overlapping small intestine. 2. Portion of small intestine.  
3. Knot in neck of tumour. 4. Mesentery. 5. Tumour split open.

or six hours. The symptoms at the onset are much the same as those exhibited in colic, but more severe, and with this exception—that in enteritis there are no intervals of rest, the pain being continuous. There is a peculiar dejected appearance and an anxious expression on the animal's face; the nostrils are dilated and very red inside, and excessive perspiration covers the body, followed by cold, clammy

sweats. At length the pain disappears, the animal stands quietly, trembling, and *sighing heavily*; the pulse, which at first was full and bounding, now becomes small, weak, and scarcely perceptible, when the patient finally drops and dies.

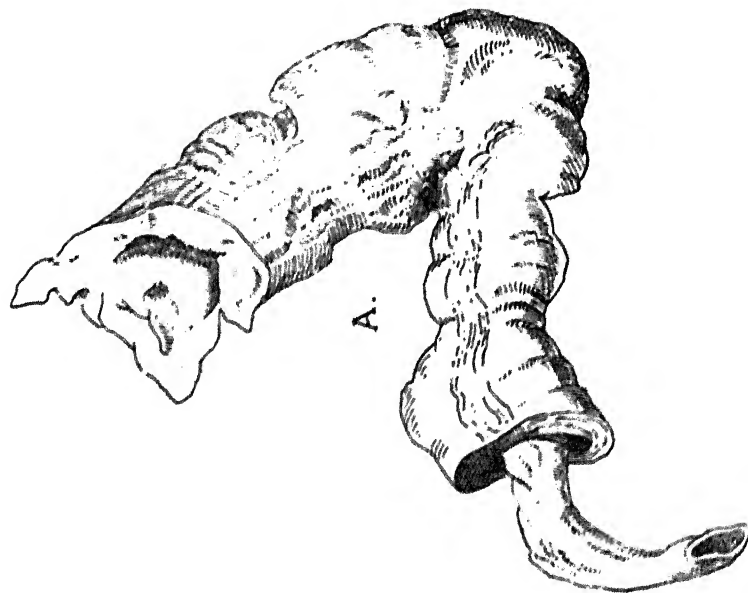
258. Numerous lesions of the horse's bowels also occur, such as large clots of blood found between the outer and inner walls of the intestine, the symptoms of which are of a subacute nature. *Loops*



FIG. 9.—COMBINED LOOP, TWIST, AND KNOT OF SMALL INTESTINE OF THE HORSE.

or *knots* are also met with, and in these cases a rent has been made in the mesentery or net—generally caused by the horse rolling and tossing about in colic—and through this a portion of the small intestine is pushed, becoming *strangulated*, and filled with dark, congested, bloody fluid. The expression of pain in such cases is something terrible to behold, the animal being dangerous to go near. Again, we have *twists* occurring, where one portion of the bowel gets rolled over another; but the pain here is not quite so violent as in

PLATE XXI



A. Telescopic Gut, 23 Inches Long.



B. Elephantiasis.

*loops.* Occasionally, through the presence of worms or action of a spasm, a part of the small intestine becomes *telescoped*—that is, drawn inside the neighbouring part. I have a specimen invaginated to the extent of 23 inches (*Plate XXI., A*). Here again the pain, though acute, is not nearly so severe as in *loops*. *Tumours* in the mesentery are sometimes formed having a long neck, which gets twisted round a part of the small intestine, thus producing strangulation. (See *Fig. 8*, p. 163.) The animal from which the photo of the section of the small intestine was taken, was ill, and suffered more or less from colicky pains from 7 a.m. on Saturday morning until 10.30 a.m. on the following Monday, when it died. It will be noticed that there is a distinct half hitch knot in the neck of the tumour. As already stated, all these lesions are accompanied with more or less severe colicky pains, and as a rule terminate fatally.

259. *Treatment* for enteritis and lesions in the intestines is the same as recommended for *gastritis* (*par. 249*), while hypodermic injections of morphia and atropine are most to be depended on. For a number of years I have noticed in lesions of the intestines that about an hour before death the animal commences to walk round and round incessantly until it drops and dies, which symptoms I have not seen in inflammation of the stomach or bowels, although large quantities of opiates have been given.

260. **Large Intestine.**—I have frequently met with cases of *congestive inflammation* of the lining membrane of the large colon in which the walls of the intestine become intensely thick and jelly-like. These cases, in my opinion, much resemble **weed** (*lymphangitis*) in the fore or hind legs, and may be induced by giving a horse affected with weed a large dose of aloes, which, acting too strongly on the alimentary canal, causes the disease to shift from the leg to the bowels. I make it a rule in very acute cases of *weed* to use aloes very sparingly, and then only in solution and combined with linseed oil. The large intestine may, however, be attacked with this inflammatory action primarily, and without weed being present; active treatment must then be adopted—sedative medicine, such as opium, hypodermic injection of morphia, also a hypodermic dose of arecoline hydrobromide, and hot blankets round the body (*par. 249*).

261. **Concretions, or Calculi**—accumulations of lime and other matters in the bowels—occur in the large intestine, and occasionally are of a great size. They are composed of dust, and phosphate of ammonia, magnesia, or lime; some are hard as a stone, and very smooth; others are soft and convoluted. Millers' horses are most subject to these. As long as the calculi remain quiet in the pouches or part of the intestine in which they were formed, no ill-effects are seen; it is only when displaced that they produce pain, and usually death. The symptoms exhibited resemble those of knots, twists, etc. (*par.* 258), but are not nearly so acute (*Plate XX., B*). As a rule, *in all cases of bowel displacement and obstruction from calculi the animal cannot keep injections or drink water*—in fact, it strains very much when enemas are given.

262. The following is an analysis of a calculus—one of six—passed by a cob of my own, 'Quicksilver,' and analyzed by the late Professor Sibson, London :

Moisture	...	...	...	...	15.24	%
Fatty matter	...	...	...	...	traces	..
* Animal matter	...	...	...	...	31.50	..
† Ammonia, magnesia, phosphate	...	...	...	...	52.16	..
Lime	...	...	...	...	traces	..
Alkaline salts	...	...	...	...	.81	..
Silica	...	...	...	...	.29	..
						100.00 ..
* Containing nitrogen from animal matter and combined ammonia						5.10 %
† Equal to ammonia	...	...	...	...	6.19	..
Specific gravity	...	...	...	...	1.71	..

The cob was always full of fire, with plenty of 'stamp, style, and fashion.' It never showed symptoms of pain, or ever refused its food, until the day it died, at the age of thirty years, of rupture of the stomach, caused by eating green tares. When in the stable, prior to passing the calculi, I frequently found this animal standing in an oblique fashion in the stall, with its near hind-leg forward, and the front of the off hind-leg stretched across the back of the near shank, the toe of the off hind-foot constantly in motion until the stone into which the masterpost of the partition was fixed, as well as the oak-sword, or plate, at the bottom of the partition, were worn



away. All the balls were passed within fourteen days, being found among the fæces. The largest one is  $6\frac{1}{2}$  inches in circumference very smooth, and quite round. The cob never had any medicine.

263. Calculi are of three kinds—viz., *phosphatic*, *oathair*, and *mixed*. The **phosphatic** are those described above; the **oathair**, very large, and oblong in shape, are made up almost entirely of the beard of grain, are much convoluted, and are known as the '**mulberry**'; whilst the **mixed** partake of the nature of both the foregoing,

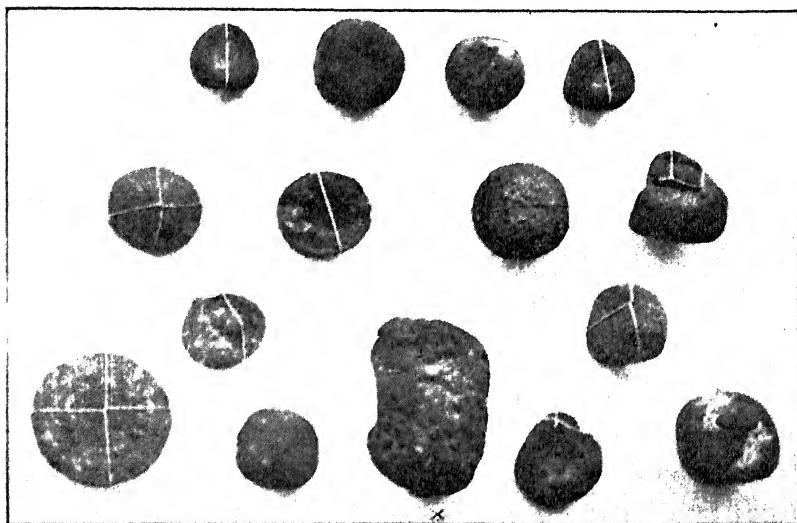


FIG. 10.—CALCULI.

× Mulberry calculi, weighed  $7\frac{1}{2}$  pounds.

but are of various shapes and sizes, and only slightly convoluted. (Fig. 10.)

264. **Constipation**, or **impaction** of the large bowel with food, causing inertia of the intestine and loss of tone, accompanied by partial paralysis. We may have it with or without flatulence. One of the greatest causes of constipation I have met with in the horse is a slight feed of new grass or clover—fog partially dried. The indications are slight colicky pains; the animal lies down, and may remain quiet for three or four hours, occasionally screwing itself on its belly, getting up, stretching, and standing with the hind-legs well

backwards, taking a bite of food now and again which causes the spasm of pain to return. *Treatment*.—A draught of from 3 to 7 drachms of aloes (according to the animal's size), in solution, mixed with 1 pint of linseed oil, is the best remedy. This should be accompanied by warm-water injections given every two hours, followed by a ball every four hours, and composed of 6 drachms of carbonate of ammonia and 1 drachm of powdered nux vomica. In all cases of bowel complication the symptoms at the onset are very much alike, and the great point is to get the animal relieved from pain as soon as possible by administering sedatives, such as opium, chlorodyne, chloral, or, best of all, hypodermic injections of morphine and atropine, along with a hypodermic injection of arecoline. I have found the following to answer admirably: Carbonate of ammonia, chloral hydrate, 4 drachms each; carbolic acid (B.P.), 30 drops; mix, and make into a ball, with the aid of linseed meal (*par. 1062, No. II.*), and administer every four or six hours if necessary.

265. **Diarrhœa, or Purging.**—This is a fluid or semi-fluid discharge of the contents of the bowels, and may be *acute, subacute, and intermittent*. **Acute diarrhœa** in the horse is very rare, but very dangerous, and may be due to some deleterious material, either in the alimentary canal or the system, and of which Nature tries to relieve herself by a spontaneous diarrhœa, in which case the animal is very sickly and dejected—standing quiet, breathing quickly, pulse hurried and weak, tongue dirty and breath fœtid; the inside of the eyelid is of a dirty orange colour, and great thirst is present; the fœcal discharge varies in colour from dirty brown to grey, with a very offensive smell. *Treatment*.—Great care is necessary, for if the diarrhœa is too suddenly checked inflammation of the bowels may result, generally with a fatal termination, or the irritation may be transmitted to the fore-feet, and set up laminitis—founder. My treatment for this form of diarrhœa is to give  $\frac{1}{2}$  ounce each of carbonate of magnesia, carbonate of soda, aromatic spirits of ammonia, and tincture of ginger, with  $\frac{1}{2}$  ounce of laudanum or chlorodyne in  $1\frac{1}{2}$  pints cold water (*par. 1065, No. I.*), repeating the dose every six or eight hours if necessary, also using well-boiled oatmeal

gruel strained through the milk-strainer, cheese-cloth, or open seed-bag sacking, 1 quart of the warm strained gruel mixed with 1 quart of cold water being offered frequently to the patient to drink. When the animal shows signs of recovery, a handful of dry oats and bran mixed can be put before it, with a small quantity of well-drawn clover hay to pick. **Subacute diarrhœa** may arise from injudicious feeding with improper food or a too hearty draught of cold water when heated, or from eating wet grass, or from over-excitement, particularly in long-middled, short-ribbed, narrow-made, washy-looking horses. Careful feeding of such animals is necessary, while the medicine mentioned under acute diarrhœa should be given. **Intermittent diarrhœa** is seen in young animals when casting the crown of their molar teeth, or from the presence of worms in the alimentary canal. Examine the mouth, and remove the crowns of the milk-teeth (*par. 352*), and give occasional doses of 15 ounces of raw linseed oil, mixed with 1 to 1½ ounces turpentine, repeating once every sixth or seventh day till four or five doses are given. **Super-purgation** is often caused in the horse by giving an overdose of purging medicine, and such frequently ends in *laminitis*. *Treatment* in this case is the same as for acute diarrhœa.

266. **Dysentery, or Bloody Flux**, is a blubbery fluid discharge from the bowels, mixed with blood. Although very common in cattle, it is very rare in the horse—at least, in this country. (*For Treatment, see par. 1065, No. I.*)

267. **Hernia, or Rupture**—a displacement of the bowel which may take place at various points—as, for instance, the diaphragm may be ruptured, and a portion of the intestines be pushed through into the chest, such ruptures generally terminating fatally. Or, again, the ‘belly-rind’ may become broken, and the intestines escape under the skin. In this case sew a bandage tightly round the body, to support the bowels, until the rupture is reduced.

268. **Scrotal Hernia** is very common in young foals; but in 95 per cent. of the cases the bowel returns to its proper place before the animal is twelve months old. Another very common hernia

is that of the navel—**umbilical hernia**, as it is called. The best remedy for this is to apply a special truss when the foal is first taken from its mother, or it may be reduced by an operation—casting the animal on to its back, and passing needles through the sac and ligaturing, or by a special clamp; this operation is, however, at times followed by blood-poisoning and lock-jaw.

269. **The Rectum.**—I have seen a number of cases where this intestine was damaged by a stick, or other foreign body, being passed up by malicious individuals, with the result that troublesome abscesses have formed, causing great straining and swelling round the vent and under the tail. These cases are best diagnosed by passing the hand into the rectum, when the lesion may be felt. When full of matter—pus—they have to be cut into through the walls of the bowel. Rupture of the rectum may take place where an aged mare is being served by a young and vigorous horse; a few cases of this kind have come under my notice, and invariably the groom has been blamed for injudicious service in the rectum, of which I am very doubtful, and do not favour the idea, for if the bowel be loaded with dung, the roof of the rectum is very readily torn from its attachments even during proper service. I have had two cases in mares, one of which was climbing over a fence and fell heavily on to her side into a ditch, and the rectum, which was full of excreta, was extensively torn for about 18 inches; the other case was somewhat similar, the animal falling while yoked in a loaded cart, the same misfortune occurring. Aged mares that have had several foals should always be examined, and the rectum emptied either with warm-water injections or with the hand before service. The principal injury, however, is found in the mare, when, in the act of foaling, one of the foal's feet is pushed through the roof of the vagina into the rectum, resulting in a troublesome fistula; or the rectum and vagina may be torn into one. In these cases there is, as a rule, extensive inflammation and sloughing of the parts (*par. 32*). Occasionally we meet with cases of **eversion of the rectum**, caused by impaction through some error of feeding, when, on attempting to pass the fæces, the rectum becomes turned out. In

such cases it must be well washed in tepid water and replaced at once, whilst warm-water injections should be given three or four times a day, dieting the animal on soft food, such as bran mash, etc. When neglected, it mortifies, becomes black, and has to be cut off, which is rather a formidable operation. Young foals when newly born suffer very much from impaction of the rectum with hard balls of meconium; the animal sets up its back, strains, and presses so much that scrotal hernia is the result. Warm-water injections must be given, and the hard balls ejected with the assistance of the finger.

**270. Paralysis of the Rectum**, or a want of power to expel the contents, is occasionally met with, when the rectum becomes impacted with faecal matters which the animal has no power to expel; and this may be due to an injury to the spine, or to degeneration of the muscular and nervous tissue of the walls of the bowel, or to fracture of the pelvic or tail bones. When first noticed the external parts around the opening into the bowel under the tail is observed to be very much distended with the faeces and pressed out behind, may be to the size of a man's head; yet the patient, as a rule, feeds well, and shows little or no inconvenience. When this is seen the faecal matter has to be removed by hand about every four or five hours; as the case advances the bladder and penis become implicated, and the urine is seen dribbling on to the ground. The penis finally becomes pendulous, powerless, and swollen, when it has to be supported by a bandage round the body, for which an old lace or net curtain answers best. *Treatment* is, however, rarely successful, but drachm doses each of sulphate of iron and nuxvomica can be given once a day in a mash; a blister applied to the loins; and an infusion of oak bark injected into the bowel once or twice daily may also be tried; but, generally speaking, the animal has to be destroyed.

## DOG.

271. The arrangement of the alimentary canal of the dog is rather peculiar. The *stomach* is pear-shaped, slightly curved, and very simple; the bowels are short and nearly all of the same size, while the *cæcum* is almost rudimentary. From the guzzling propensity of the majority of dogs, the crushing and bolting of partially chewed bones, and the cramming of the stomach with raw, putrid, filthy flesh, it is strange that the dog does not suffer more from derangements of the stomach and bowels. The great point in the dog's favour is that he can readily eject matters from an overloaded stomach. Although numerous writers have from time to time written at some length on the various derangements and diseases of the stomach and bowels of the dog, I can only say that in country practice they are very rare. Those that are mostly met with are *indigestion, costiveness, impaction of the rectum, diarrhœa, worms, and liver disorders.*

272. **Indigestion**, or a want of tone to convert the food into nutriment, is mostly seen in old, fat, and pampered dogs. The symptoms are a morbid appetite, foul breath, and a great fancy for eating or chewing foreign bodies, such as rope, wood, rags, etc., accompanied by costiveness. When these are observed, the dog should be carefully watched and sparingly and regularly fed. *Treatment.*—The following tonic alterative medicine can be given: 10 grains each of powdered aloes, rhubarb, bicarbonate of soda, and extract of gentian, made up into a small ball or pill, and given once every other day if necessary. The above dose is for an adult collie or spaniel, and larger and smaller doses ought to be regulated according to the age, size, and breed of the dog.

273. **Costiveness**, or retention of the fecal matters in the intestine. The feces of the dog are, as a rule, of a very dry nature, and usually expelled with a great amount of straining, due to the great fondness the dog has for eating bones, without a sufficiency of other food to counteract the dry, costive effect. The symptoms are somewhat analogous to those given in the preceding paragraph (272), but on pressure being applied to the belly with the fingers behind

the ribs the bowels feel hard and stiff, and pain is generally evinced. *Treatment.* — Purgatives must be given with great caution; the medicine named in *par.* 272 can be given, followed by small doses of syrup of buckthorn and castor oil; but the most reliance must be placed on enemas, and nothing is better than 1 ounce of glycerine mixed in  $\frac{1}{2}$  pint of warm water, and injected into the bowels once every eight hours if necessary.

**274. Impaction of the Rectum**—accumulation of feces in the back bowel. This arises from causes similar to those given in the above paragraph (273), and a similar *Treatment* has to be adopted, only the hard impacted matter, which generally contains sharp pieces of bone, has to be removed with the finger, well oiled, assisted by the warm water and glycerine injections.

**275. Diarrhœa**, a discharge of the contents of the bowels in a fluid or semi-fluid condition, is often seen in the dog without any constitutional disturbance, and greatly depends on what the animal has been eating. *Treatment.*—Should the purgation become troublesome, a dose of castor oil—from 1 teaspoonful to 2 tablespoonfuls—with 5 to 30 drops of laudanum, according to age and size of dog, may be given. This may be all that is required, but if necessary, follow up with 5 to 20 grains subnitrate of bismuth, 10 to 60 grains carbonate of soda, and 10 to 60 grains of carbonate magnesia, according to age and size. Mix, and give in a little warm milk twice a day.

**276. Worms.**—From the uncleanly feeding habits of the dog, the digestive organs become a veritable harbour for worms, of which there are a great variety. The kinds mostly met with are the *Ascaris marginata*, or common round worm, and the *tape-worms*. The *Ascaris marginata* vary in size from 2 inches to 6 inches, and are generally found in the stomach and small intestines, while occasionally they are vomited up. Young puppies are frequently infested with these worms as early as a fortnight old and upwards, the eggs from which they are developed coming from the intestines of the mother. They get located under the tail and round the opening into the bowels, and are transferred from there to the teats by the tongue of the mother, and from there suckled into the stomach by the young

puppies. For these young animals, small doses of *santonin*—from  $\frac{1}{2}$  to 1 grain given every four or six days in a little milk—answers best.

277. **Cystic Worms.**—*Tænia*, or **tape-worms**, of which there are several kinds, are numerous in the dog. Symptoms of the presence of worms vary a great deal. Sometimes constipation is present, at other times intermittent diarrhœa, variable appetite, loss of flesh, rough, staring coat, gummy eyes, and a dry nose; in fact, the animal is all out of sorts. *Treatment.*—In all cases, particularly when the skin is much affected, a dose of worm medicine should be given. I have tried different kinds of formulas, but what I find to answer best is as follows: Powdered *areca-nut*, from 10 to 60 grains; *calomel*, from  $\frac{1}{2}$  grain to 3 grains; and *tartar emetic*,  $\frac{1}{2}$  grain to 3 grains, made into a ball with fluid extract of male shield fern, to be given after fasting, followed up with a dose of castor oil.

278. **Liver Disorders.**—(See Lecture VI., ‘Digestive Organs,’ Part II.)

### FIG.

279. Considering the scavenging habits and the filthy conditions under which pigs are generally brought up, it is a great wonder they do not suffer more from affections of the digestive organs. The ailments most commonly met with are *gastritis*, or inflammation of the stomach, *constipation*, *diarrhœa*, *worms*, and *protrusion of the rectum*.

280. **Gastritis.**—Inflammation of the stomach is generally caused by consuming irritating indigestible substances, drinking salt brine, the presence of worms, etc. When attacked, the animal is very restless, refusing all foods, vomiting, and has a great thirst, while sometimes the attack is accompanied by diarrhœa or constipation. *Treatment.*—When constipation is present, small doses of castor oil in milk can be given every six or eight hours. If the pain be severe, a teaspoonful of *chlorodyne* and 5 to 10 drops of pure *carbolic acid* may be added; warm water and glycerine enemas should be given every six or eight hours, and flannels wrung out of hot water ought



to be rolled round the body, with a waterproof covering above. When diarrhœa is present, small doses of castor oil, containing from 20 to 30 drops of laudanum, should be given at the onset, followed up with 20 grains each of bismuth, bicarbonate of soda, magnesia, and cassia, given in a little warm milk every six or eight hours if required. Young pigs often suffer from gastritis when fed on unboiled or unsalted Indian meal. When thus fed they are also liable to take fits. Indian meal should not, therefore, be given to very young pigs. Sharps or parings, with bran, well scalded or boiled, answer better.

281. **Constipation** in pigs is generally caused by injudicious feeding or through overfeeding on too much dry food. Sows that are close on pigging also often suffer both before and after parturition from obstinate constipation. *Treatment.*—If there is one thing more than another that I advocate for this ailment it is croton oil. I know of no other animal that can stand dosing with croton oil like the pig, and I have frequently given from 10 to 20 drops of croton oil mixed in 1 teaspoonful of soft sugar and put on to the pig's tongue; this can be done without much trouble. Half the quantity may be repeated if necessary. Warm-water enemas must be given three or four times in the twenty-four hours, while 2 quarts of cold water in which a dessertspoonful of bicarbonate of soda has been dissolved can be offered to drink, and this should be changed every four or five hours.

282. **Diarrhœa**, or scour, is occasionally seen in the adult animal, and is generally the result of some offending matter in the alimentary canal or system; in fact, scour is at times Nature's own cure. When seen, a dose of castor oil and laudanum may be given at the onset, followed up with bicarbonate of soda and bismuth (*par.* 275). Young pigs are great sufferers from diarrhœa when sucking, and it is mostly due to *damp floors*, bad drainage, and scarcity of good dry bedding—in fact, the want of good sanitation. *Treatment.*—First clean out the sty, thoroughly wash down the walls and floor with boiling water and carbolic acid, then limewash the walls. A good dry bed should be made of short straw or chaff, and the mother given teaspoonful doses of bicarbonate of soda three times

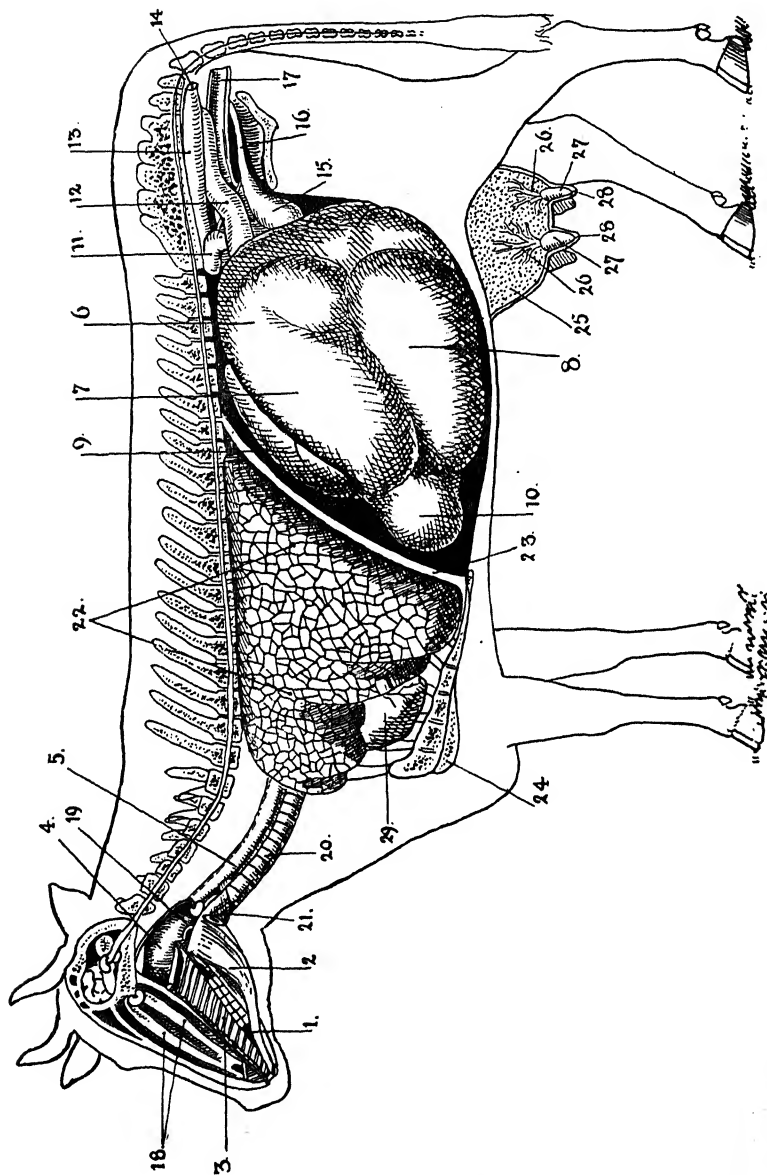
a day in her food. Diarrhœa in pigs is also present in cases of tuberculosis.

283. **Worms.**—As a rule pigs do not suffer so much from worms in the intestinal canal as might be supposed, considering the animal's filthy habits. There are, however, several kinds of worms found in the pig, the most common being the *Ascaris suilla*, a worm creamy white in colour, and varying from 3 to 7 inches in length, which is found in the stomach and small intestine, and is of the nematode or round worm order (*Plate XIX.*). *Symptoms.*—When infected with worms, the animal is restless and hide-bound, with the skin dirty, dry, and scaly; the belly is tucked up and the back arched; there is occasional diarrhœa and vomiting, and, when the worms are numerous, convulsions or fits. *Treatment.*—The medicines named for worms in the dog (*par. 277*) can be given in a little milk, or the powders can be mixed in castor oil and milk and administered by the aid of a clog with a wooden sole, or a strong shoe with a hole cut in the leather at the toe (*Plate LIV., No. 3*). Press the clog into the mouth of the pig and pour the medicine inside, when it will be swallowed without the danger of choking. Daily doses of one to two teaspoonfuls of flowers of sulphur answer well for worms, while turpentine in doses varying from 1 teaspoonful to 1 tablespoonful mixed with oil and milk, or beaten up with an egg and given as described above, also has a good effect.

284. **Protrusion or Eversion of the Rectum** is sometimes met with in young pigs, but most frequently in sows after parturition. When seen, the parts must be thoroughly washed with tepid water and Sanitas, smeared with extract of belladonna, and returned, and then kept in its place by stitches of tape put across the opening.

285. **Imperforate Anus.**—Calves, lambs, and pigs are occasionally born with the end of the bowel covered up, and blinded by a continuation of the skin over the opening. On manipulating with the fingers, the hard fæces are felt underneath. It is very easy with a sharp knife to cut through the skin into the canal, and to dress the wound daily with antiseptic mixture (*par. 1060, No. III.*), until the parts are healed, when the animal, as a rule, generally does well.

PLATE XXII



## EXPLANATION OF PLATE XXII

- |   |                                   |
|---|-----------------------------------|
| 1. Cavity of the Mouth, with 6 Molar Teeth. | 15. Bladder.                      |
| 2. Tongue.                                  | 16. Neck of Bladder.              |
| 3. Roof of Mouth showing Ridges.            | 17. Vagina.                       |
| 4. Pharynx or Throat.                       | 18. Turbinated Bones in Nostrils. |
| 5. Esophagus or Gullet.                     | 19. Entrance to Larynx.           |
| 6. First Stomach or Paunch.                 | 20. Trachea or Windpipe.          |
| 7. Left Upper Portion of Paunch.            | 21. Thyroid Glands.               |
| 8. Left Lower Portion of Paunch.            | 22. Left Lung.                    |
| 9. Spleen.                                  | 23. Diaphragm.                    |
| 10. Second Stomach or Honeycomb.            | 24. Sternum or Breast Bone.       |
| 11. Colon.                                  | 25. Section of Udder.             |
| 12. Cæcum.                                  | 26, 26. Milk collecting Ducts.    |
| 13. Rectum.                                 | 27, 27. Milk Sinus.               |
| 14. Anus.                                   | 28, 28. Duct of Teat.             |
|   | 29. Heart.                        |

## LECTURE VI

### THE DIGESTIVE ORGANS

#### PART II

286. THE organs of digestion in ruminants, prior to the stomach itself, present few differences from those of the non-ruminants. Certainly, the mouth does contain distinctions; for whereas that of the horse has incisor teeth in both upper and lower jaws—six in each—cattle and sheep possess them in the lower jaw only, their place in the upper one being taken by a fibro-cartilaginous pad. Canine teeth are also only found in the lower jaw, and they closely resemble incisors in shape; they are placed close to the corner incisors, there being no interval between canine and incisors as is the case in the horse. The tongue, too, is of a different shape, being short and pointed, and instead of having a smooth surface, it is extremely roughened by little papillæ. It is also the prehensile agent. The soft palate, though present, is much less developed than in the horse. When we come to the stomach, however, we encounter wide differences. Cattle and sheep have four stomachs, or, to be more precise, a stomach divided into four compartments.

The first is the *rumen*, or *paunch* (Plate XXIII., Nos. I. and II., A A A A).

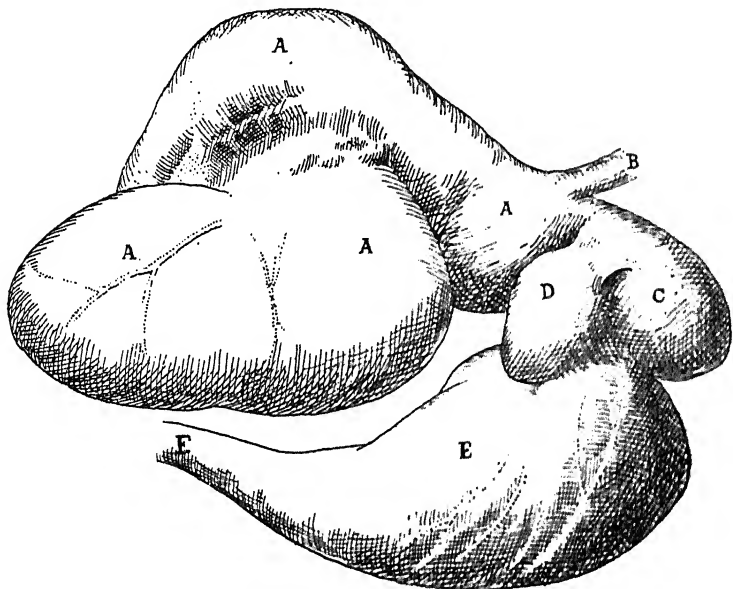
The second is the *reticulum*, or *honeycomb* (Plate XXIII., C C).

The third is the *omasum*, or *manyplies* (Plate XXIII., D D).

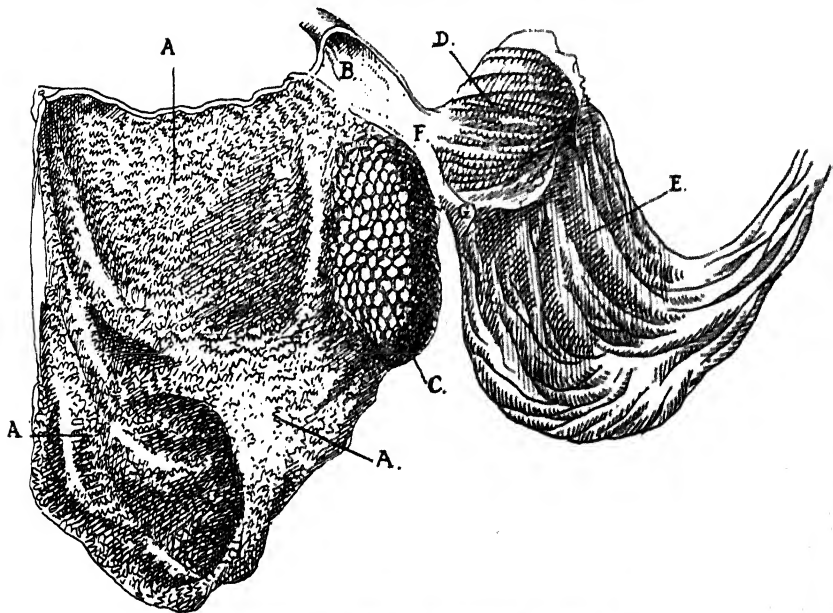
The fourth is the *abomasum*, or *True Digestive Stomach* (Plate XXIII., E E).

The first, second, and third stomachs are compartments for storing and preparing the food—more particularly the cellulose portions of it—for digestion by the fourth.

PLATE XXIII



1. External Appearance of Cow's Stomach.



2. Internal Appearance of Cow's Stomach.

## EXPLANATION OF PLATE XXIII

### 1. External Appearance of Cow's Stomach.

- A A A A. First Stomach, Rumen or Paunch.
- B. Oesophagus or Gullet.
- C. Second Stomach, Reticulum or Honeycomb.
- D. Third Stomach, Omasum or Manyplies.
- E. Fourth, True Stomach, or Abomasum.
- F. Pyloric Portion of Fourth Stomach.

### 2. Internal Appearance of Cow's Stomach.

- A A A. First Stomach, Rumen or Paunch, showing Pouches, Muscular Bands, and Papillæ.
- B. Oesophagus or Gullet laid open.
- C. Second Stomach, Reticulum, everted to show the honeycombed cell appearance.
- D. Third Stomach, showing the Leaves.
- E. Fourth Stomach, with its numerous folds.
- F. Oesophageal Canal leading to Fourth Stomach.
- G. Oesophageal Canal entering the Fourth Stomach.
- H. Small Intestine.

287. *The First Stomach, the Rumen* (Plate XXIII., A A A A), which is the largest of the four stomachs, and lies on the left side, occupies, in the adult animal, about three-quarters of the whole abdominal cavity. It has strong, muscular bands running in the walls in various directions to assist and control its actions, and is very strong. It is also lined with cuticular membrane, which is studded all over with little projections, or papillæ.

288. *The Second Stomach, the Honeycomb* (Plate XXIII., C C), which is the smallest of the four stomachs, is also lined with cuticular membrane, that is pitted all over with little cells, giving it a resemblance to honeycomb, and is covered with papillæ. This stomach acts as a sort of sifting-machine, as in it we find sand, stones, nails, pins, needles, and all sorts of foreign bodies, sifted out of the food before being sent to the third stomach.

289. *The Third Stomach, the Manyplies* (Plate XXIII., D D), has its lining membrane arranged in a peculiar manner, forming a large number of leaves, or folds; hence its name, *psalterium*, or *omasum*—manyfolds, or manyplies. The leaves run lengthwise, and extend from one end to the other, one border being free, while the other is attached to the wall of the stomach. Between the large leaves there are smaller ones, all being covered with small projections, or papillæ. The function of this stomach is to press and triturate the food before it passes into the fourth stomach.

290. *The Fourth Stomach, the Abomasum* (Plate XXIII., E E), is the true digestive stomach, and in the calf it is much the largest. The interior presents the appearance of large folds, running lengthwise over its surface, and this mucous membrane is soft, velvety, and of a pale pink hue. Here the food is chemically acted upon, as described in *par.* 223 (*No.* V.).

291. **Rumination, or Chewing the Cud.**—This process consists of returning the coarsely masticated food, stored in the *rumen*, back into the mouth, to be there remasticated and properly mixed with saliva. Some portions of the food are returned several times,



whilst others only require one chewing. My view of rumination differs considerably from that of some other writers, and is as follows: The animal fills the paunch with food of various kinds, principally of a bulky nature, taking little or no trouble to masticate it. Then, when the animal has had its fill, it rests and commences to chew the cud. Small pellets or boluses are formed by the churning motion of the rumen. These pellets are then passed to the second stomach, where the fine portions, such as meals, cakes, and bran, are sifted out, and carried at once to the third stomach, while the rougher portions are formed into a bolus and thrown up the gullet into the mouth, to be properly chewed and insalivated. This process over, it is again swallowed and sent back into the paunch; thus, some portions of the food are remasticated several times, while foreign bodies, such as sand, nails, etc., as already mentioned, are left in the second stomach. My idea of this process originated many years ago on performing *rumenotomy*—that is, cutting into the stomach and removing its contents. On putting my hand through the opening in the left side, I found in the upper and back part of the rumen a number of small pellets of food, varying in size from that of a nut to a good-sized apple, and I came to the conclusion that by the action of the muscular bands found in the walls of the paunch these pellets were rolled up and carried over the top of the food lying in the bottom of the paunch to the second stomach, to be there sifted, as already stated (*par.* 288). None of the compartments, except the rumen, is large enough to hold all the cud that the animal chews at once, and the second stomach, which is said by some to be the water-bag, is so small that it would not hold a tenth part of the quantity of water which an animal drinks at a time.

292. The **small intestine** in cattle is much less in diameter than that of the horse, yet it is about twice as long, being about 140 feet in length. The **large intestine** is about 36 feet in length. The **cæcum**, or first portion of the large intestine, is very simple, and oblong in shape; its free or blind end is rounded, and without any bands or furrows. It joins the *colon* at its other extremity, where it also receives the insertion of the small intestine. The **colon**, or second

portion of the large intestine, is narrow and without bands or furrows, and is arranged in irregular coils, and finally ends in the **rectum**.

293. **Sheep**.—The *alimentary canal* in sheep resembles that of cattle throughout.

### DERANGEMENTS AND DISEASES OF THE ALIMENTARY CANAL AND ACCESSORY ORGANS.

294. While in the horse the large intestine is the organ most frequently affected, cattle suffer principally from derangements and diseases of the four stomachs.

295 **Hoven**, or **Tympanites**, an overdistension of the rumen with gases, is of very frequent occurrence, and is both *acute*, *chronic*, and *intermittent*. The causes are many; but one, the most common, is due to cattle being turned on to the clover fog and gorging themselves. Hoven from such a cause is very acute and dangerous, and frequently fatal if not speedily relieved. Eating too much wet grass or frosted turnips, or drinking cold, frosted, or snow water are also frequent causes of tympanites. For the *Treatment* of such cases nothing answers better than 1 wineglassful of turpentine in 1 pint of raw linseed oil. Should this not give immediate relief, the patient must be punctured *on the left side* with a trocar and cannula (*Plate LIV., No. 6*); if this instrument is not to be had, then plunge the large blade of a pocket-knife into the stomach and turn it crossways, when the gas will escape. Fermentation of food is another common cause, and nothing is worse for this than an over-feed of potatoes, followed by a hearty drink of cold water. A beast that has unfortunately gained access to a potato-heap and gorged should not be allowed any water for three or four days. It should be fed on small quantities of rough straw, as distension from this cause is extremely dangerous, the contents being of a yeasty character. *Treatment* in such a case is to administer 2 ounces of bicarbonate of soda in 1 pint of cold water and 1 pint of whisky, or 4 ounces of hyposulphite of soda in the same quantity of water and spirit. If this does not give speedy relief, then the trocar and

cannula must be inserted into the side, and the hyposulphite of soda and water, as above, or a solution of chloride of lime, be injected into the stomach through the cannula by a small enema syringe. Choking with potatoes, turnips, etc., also causes the stomach to be distended with gas (*par.* 240). When the animal picks up foreign bodies, such as stones, bones, leather, wood, etc., or has tumours, abscesses, or hair-balls in its stomach, there are periodical or intermittent distensions about every five or six hours. These are very difficult to treat. Tablespoonful doses of *chloride of lime* in milk, or 2 ounces hyposulphite of soda in water, at times gives relief in such cases. The stomach also becomes periodically distended with gas from rupture, stricture, or dilatation of the gullet, or from a rent in the rumen (*par.* 241). In these cases, the sooner professional advice is got, the better for the animal and the owner as well.

**296. Impaction of the Rumen—Plenaltia, Grain Sickness**—an overdistension of the stomach with food. This derangement occurs in stall-fed animals, more particularly if they have had an excess of dry food, such as meals (of doubtful quality) or frosted turnips. The walls of the stomach become partially paralyzed, and their actions are suspended. Sometimes there is gas present, and the left side of the animal is seen to be distended. *Symptoms.*—On pressing the fingers into the flank, between the last rib and haunch bone, the stomach is felt to be full and doughy, and at times slightly ‘drummy.’ The animal stands perfectly still, emitting a peculiar ‘grank’ or ‘grunt.’ The head is extended, nose slightly lowered, and back arched, while there is a thoughtful expression on the face. The pulse may, or may not, be disturbed, but I have never seen any indication of colicky pains, as described by some. The appetite is entirely gone, and rumination is suspended; while in the milch cow the secretion is stopped. There is generally slight diarrhoea at the onset, but this soon stops, and then no fæces are passed for some days. *Treatment.*—If gas is present, 1 pint of linseed oil and 2 ounces of turpentine should be given first, followed up in an hour or so by 10 to 16 ounces of Epsom salts, along with 2 ounces each of powdered

ginger and sweet peppers, or other aromatics. These should be given in a quart of thin gruel, mixed with another pint of oil. Owing to the distension, the walls of the stomach lose their tone and become inert, and are unable to perform their function, the derangement often being further aggravated by the owner continually dosing the animal with too many sickly purgatives instead of administering warm stimulating tonics and cordials, which are mostly required after the first purgative has been given. These cases require time and patience, as they are very difficult to manage, for in many instances, and according to the will and condition of the animal, the medicine drops into the paunch or rumen and remains inert, whilst in other cases the drench passes along the œsophageal canal, through the third and fourth stomachs, and establishes its action. After all medicines have failed in this derangement, I have been very successful with an old-fashioned remedy—namely, 3 to 3½ pounds of fat bacon, cut up into small pieces and boiled for two or three hours in water, along with the addition of 6 ounces of salt, then mixed with a quart of milk, and given as a drench. This must be put in with a horn—as, indeed, ought all cattle drenches—and a few gallons or so of bran or hay tea or cold water should be placed for the animal to drink. I have rarely seen this mixture fail in having the desired effect where no organic lesion was present, and I find it answers much better than repeated doses of raw linseed oil.

297. When the rumen has become very much impacted by the animal getting loose in the byre and gorging itself with corn or other foods, medicine has little or no effect. Good results are sometimes had by cutting into the stomach on the left side, making an opening about 6 or 8 inches long, and emptying the rumen with the hand. This operation is called *rumenotomy*, and should be performed only by a fully qualified professional man, as there are several important points to be observed before, during, and after the operation. When the rumen has been distended either with gas or food, and after relief has been given, it will be some considerable time before the stomach regains its normal tone, and the animal, therefore, has to be fed with

great care and judgment. In such cases of distension, if the animal is a cow in calf, she is almost sure to abort.

298. **Vomition, or Vomiting**, a forcible ejection of the contents of the stomach through the mouth, while not of frequent occurrence in either, is oftener found in cattle than the horse. It has been said that the horse cannot vomit; but I have seen this occur at least on three occasions, when the animal dropped on its knees, pressed its nose on the ground with side movements of the head, and food came out of both nostrils and mouth. There was no rupture of either the gullet or stomach, as the animals in question lived and did well for years after. At times the feeding-trough in front of cattle is found full of vomited matter. This derangement is generally due to foods containing an excess of starchy matter, as potatoes; from chronic disease of the stomach; or from obstruction of the small intestine. *Treatment*, ounce doses of bicarbonate or hyposulphite of soda dissolved in  $1\frac{1}{2}$  pints of warm water and  $\frac{1}{2}$  pint of whisky, or 1 ounce of fluid extract of ginger added and given every six or eight hours, can be recommended, with linseed jelly or skim milk, containing  $\frac{1}{2}$ -pint doses of lime water, to drink.

299. **The Second Stomach**.—There are no set symptoms to indicate any derangement of this compartment. As already stated, it is a receptacle for all kinds of foreign bodies, some of which, such as darning-needles, shawl-pins, pieces of wire, occasionally pass through its wall, thence through the diaphragm to the lungs and heart (*par. 442*). In cases of derangement of the paunch the second stomach is also more or less implicated.

300. **Indigestion, or Impaction of the Third Stomach—Fardel Bound**.—Cattle, when hard fed in stalls, or in spring, getting a chill at grass, or through eating a mixture of old, dead, and new spring grass, or the deciduous stipules or 'bud scales' falling from oak-trees ('yak-buds,' Cumberland), frequently suffer from indigestion and constipation. Here rumination, the action of the bowels, and the secretion of milk are suspended. The animal stands in an extremely stiff and listless fashion, emitting a *continuous grunt* and

grinding its teeth, while, on pressure being applied to the spine behind the shoulders, it is likely to fall on its knees, uttering painful groans. The functions of the manyfolds being stopped, the leaves of the organ become partially paralyzed from impaction of the food. Any of the causes affecting the rumen may also occasion derangement of this pouch, and a somewhat similar *Treatment* must be adopted (*par.* 296). Small doses of purgative medicine, with cordials (*par.* 1070, No. II.), and from 12 to 15 ounces of linseed oil or castor oil, may be given with advantage every six or eight hours, following up this treatment by offering small quantities of rough oat-sheaf, dry hay, cabbage-leaves, etc., to induce and encourage the action of the stomach, and hay, nettle, or bran tea and cold water to drink to be offered freely. Occasionally foreign bodies, such as stones, nails, etc., find their way through the opening into this stomach, and stick there. I remember one case, in which a flat stone got tightly fixed in the entrance. The animal had a continuous dry, barking cough, held its head and nose straight out, and would not touch food or water. I ordered it to be slaughtered, and found the stone in the position named. The cough in this instance was reflex, caused by pressure on a branch of the vagus nerve. In another case five stones, a penny piece, and a nail, were the bodies of obstruction; while in a third a salmon fish-hook was fixed through three of the leaves of this compartment. *Inflammation* of the first, second, and third stomachs is very rare, either in cattle or sheep.

301. **The Fourth, or Digestive Stomach**, suffers most from inflammation (*gastritis*), and is frequently caused by the drinking of strong acids, or through mineral, alkaline, or fungoid poisons, etc. As already stated, the first three stomachs, being merely preparatory organs preparing and sifting the food for digestion by the fourth, are lined by cuticular membrane resembling the outer skin, so that poisonous materials rarely have much effect on them; but when the poison reaches the fourth stomach, with its fine velvety mucous membrane and digestive function, it soon establishes its action. I have known arsenic to have been taken by cattle, which showed no

ill-effect till the fourth and up to the eighth day, when the poisonous action set in, killing them in from four to six hours. The abdominal pain, perspiration, and excitement in these cases were something frightful to see; the animals became quite frantic, then dropped down, and died suddenly. Drinking water from streams wherein coal wash has been discharged is said to have an injurious effect on this stomach, causing great emaciation, hide-bound, chronic diarrhœa, and eventually death. I have been engaged in several litigations relative to this, and must say that I have never yet found any injurious effects arise from cattle drinking the black coal water. But should the washed material from the sides of the burning refuse banks adjoining the coal-pit—charged as it is with free sulphuric acid and sulphates—get into a stream, and animals be allowed to drink this water for any length of time, chronic inflammation of this stomach and of the bowels, with great emaciation and fatal diarrhœa, is the result, followed by a slow, lingering death from inanition. Irritation and inflammation of this stomach is at times also set up by the irritating husks of castor or croton beans and other deleterious seeds having been incorporated in feeding-cakes. Moulded cakes, particularly undecorticated cotton-cake, have also a very injurious and frequently fatal action on this stomach. **Micro-organisms.**—**Small worms**—**Strongylus contortus** and other thread-like pests which infest the lining membrane of this stomach and intestines of both cattle and sheep—also cause great irritation, exhaustion, diarrhœa, and extreme emaciation, and this is particularly the case in young animals in cold wet seasons (*par.* 309). *Treatment.*—First find out the cause, and, if possible, remove it, and follow the recommendation laid down in *par.* 249. The post-mortem appearance of the stomach resembles that exhibited in the horse, as noted in *par.* 250.

302. **Lead-Poisoning** is both *acute* and *chronic*. In the acute cases the attack is sudden, and resembles stomach staggers (*par.* 304) at first, or the latter stages of milk fever (*par.* 582), accompanied by paralysis and coma, and may be caused by the animal picking up spent bullets near rifle ranges or grazing on lands near lead-

smelting works, but it is most frequently seen on pastures where town rubbish has been spread, or where the scrapings of paint-tins and tea-lead have been deposited; sometimes it is due to the animal getting to tins of white lead and eating the contents. I have seen three cases from this latter cause. The salts of lead are very sweet, and cattle eat them with great relish. *Treatment* is generally of very little avail; 60-drop doses of sulphuric acid, largely diluted with cold water, might be pumped into the stomach, to act on the lead chemically, and form the insoluble sulphate of lead; and this should be followed up by  $\frac{1}{2}$ -pint doses of raw linseed oil every six or eight hours. In chronic lead-poisoning the animal slowly dwindles away, blue lines being noticed round the gums. Thirty-drop doses of sulphuric acid, with 1 drachm of sulphate of quinine, given in 1 quart of cold water twice a day, is in such cases useful.

**303. Vegetable Poisons.**—Plants of a poisonous nature are many, and, considering their distribution, it is astonishing that there are not more fatal cases. Some of the most common and well-known poisonous plants are as follows: **Hemlock** (*Conium maculatum*); **Fool's parsley** (*Aethusa cynapium*); **Water hemlock, or cowbane** (*Cicuta virosa*); **Water dropwort, or dead tongue** (*Aënanthe crocata*); **Deadly nightshade** (*Atropa belladonna*); **Foxglove** (*Digitalis purpurea*); **Monkshood** (*Aconitum napellus*); **Yew-tree** (*Taxus baccata*); **Rhododendron** (*Ponticum*). The half-dried twigs of the yew-tree and rhododendron, as already stated, are more acute and dangerous than the green branches (*par.* 250). The water dropwort, or dead tongue, is sometimes mistaken for the water hemlock, or cowbane; both plants are, however, poisonous to cattle, and great care should be taken, when ditches are being cleaned out, that the roots of these plants are gathered, dried and burnt, as, when half dried, cattle are very fond of them. The green leaf of the foxglove, in the winter months, when the ground is covered with snow, is also dangerous to sheep, and should be cut down and removed from pastures on which sheep are grazing. Vegetable poisons usually prove fatal on account of the peculiar arrangement of the stomach compartments of cattle and sheep, which permits of



large quantities of the poisonous material being gathered before the poisonous action is established, thus rendering treatment of little avail. *The symptoms of, and treatment for, vegetable poisoning* are discussed in *par.* 250. **Acorns.**—Although pigs eat acorns with impunity, yet when taken in excess by horses and cattle they are very dangerous, causing indigestion and, at times, death. When plentiful, they should be gathered off the ground. Two tablespoonfuls of ground coffee put into 2 quarts of hot water, stirred well up, and drenched into the animal every four or five hours in cases of vegetable poisoning, has a highly beneficial action. An occasional teacupful of raw linseed oil can also be added with advantage.

304. **Stomach Staggers**, acute indigestion with head symptoms, is most frequently seen in the summer months, more particularly in dry seasons, and where cattle are grazed on hilly pastures or on first and second years' crop of seed-grass; it is not nearly so rife on old-laid pastures. It is thought to be caused by the rye-grass aborting, or seeding prematurely, but an overfeed of green rye-corn will cause the identical same symptoms. No doubt the heat of the sun and the dryness of the grass in the first place have much to do with it, through inducing acute indigestion with head symptoms, while in the second place some peculiar chemical action seems to take place just when the rye is blooming, so that if large quantities are consumed about this time, the rye has a peculiar toxic action, producing delirium, followed by coma. *Symptoms.*—The animal stops feeding and chewing the cud; the hair looks dingy and on end, with muzzle dry; the sides appear flat, the belly tucked up, and the patient is very listless. If a milch cow, she suddenly drops off her milk. This goes on for thirty-six or forty-eight hours, when the pupil of the eye is noticed to be dilated, and the eye has a starry appearance; the breathing is slow and heavy, and the animal stands over on its fetlocks. At the commencement there is slight diarrhoea, followed by considerable constipation, due to the want of nervous energy in the stomachs and bowels. If large doses of purgative medicine have been given, there may be a watery discharge from the bowels,

but little or no fæces. At this stage the animal begins to press its head against the wall and snores loudly, or when let out seems quite blind, rushing forward or backward, and tumbling over any object which may be in the way. *Treatment.*—The administration of strong saline purgatives, such as Epsom or Glauber's salts, are to be strongly condemned. In the first stages raw linseed oil, in from 8 to 10 ounce doses, mixed with 1 drachm of quinine and a teacupful of whisky, should be given every six or eight hours in 2 quarts of strong coffee; plenty of boiled gruel, linseed jelly, and bran or hay tea and cold water, should be offered the animal to drink, the object being to get some food into the stomach to neutralize, or at least modify, the action of that which is causing the complaint. Once the patient begins to press its head against the wall, the best plan is to have it slaughtered.

305. **Spasmodic Colic** in cattle is mostly manifested by the animal kicking at its belly, switching and twisting the tail, lying down, and getting up with occasional intervals of rests, for one or two hours, when a renewed attack occurs, and this condition lasts for twelve or more hours. As already stated, the arrangement of the intestines of cattle is quite different to that of the horse; they are much smaller, but a great deal longer. On account of cattle being of a less excitable temperament, they do not suffer so much as the horse from bowel complaints, but are more prone to stomach derangements. Spasmodic colic in the cow is sometimes readily enough relieved, but at others may go on for some days. *Treatment.*—From 8 to 12 ounces of linseed oil should be given, mixed with  $\frac{1}{2}$  to 2 ounces each of veterinary chlorodyne and turpentine, and half the quantity repeated in six or eight hours if necessary.

306. **Enteritis**, or inflammation of the bowels, in cattle is, happily, very rare. The animal lingers on for four to six days, whereas in the horse it would prove fatal in as many hours. Nor do cattle exhibit the acute symptoms seen in the horse, but lie continuously, breathing quickly, with a sharp, moaning grunt, and appearing very much depressed. *Treatment.*—Chlorodyne from 4 drachms to 2 ounces, or the same quantity of laudanum, in 8 to 12 ounces raw linseed oil,

can be given every four to eight hours, and blankets wrung out of hot water should be rolled around the body, with a waterproof covering on the top.

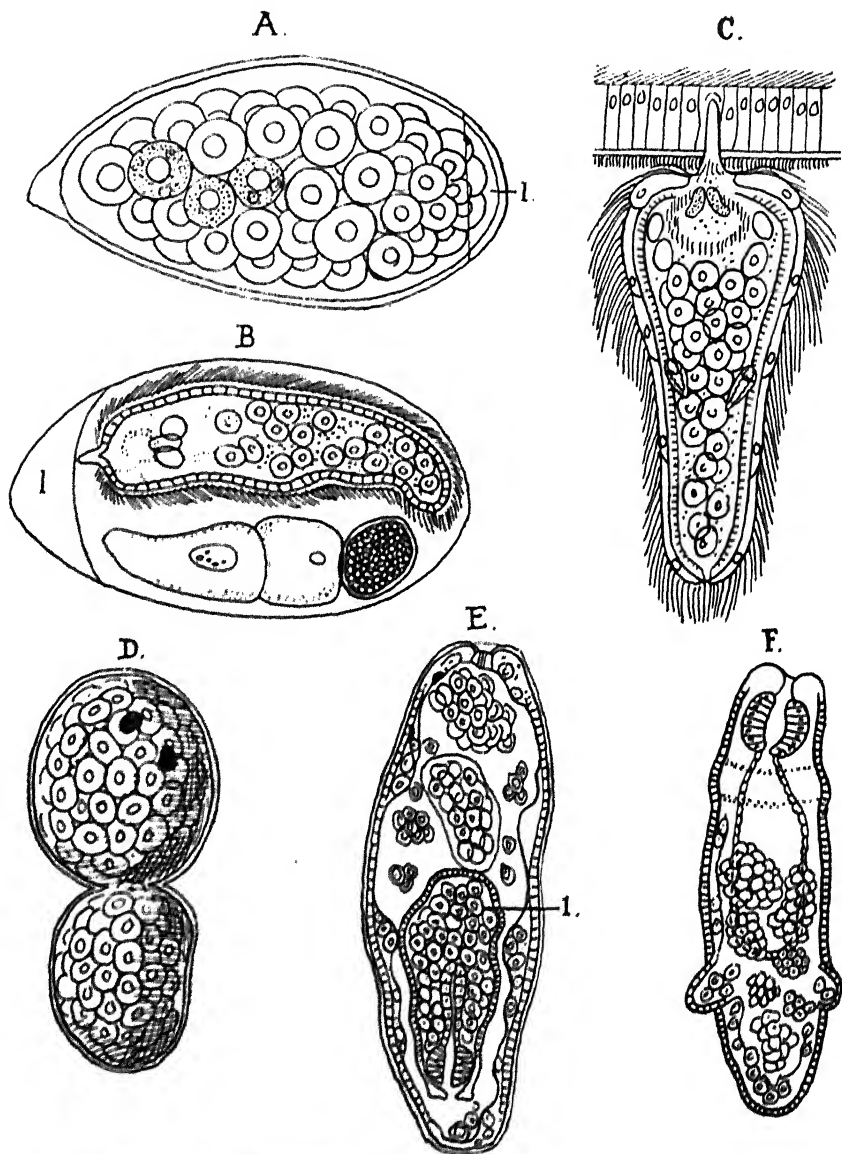
307. **Gut-Tie** is due to some false membrane forming in the abdominal cavity and getting attached to or encircling some part of the intestines. It is mostly found in young bullock-stirks, yet I have seen cases in young heifers. Unlike horses, cattle bear this very patiently, lingering on for six or seven days, where it would only take a like number of hours for a horse to fight itself to death. The animal stops feeding, twitches the hind-quarters, elevates and twists the tail, crosses one hind-leg over the other, and occasionally, with pain, passes a small quantity of bloody mucus. If let out, it has a great tendency to walk backwards, and, if near a bank, will back its hind-legs on to the top, and stand with its fore-feet in the ditch. This appears to give great relief. *Treatment*.—It is dangerous in this ailment to give large doses of purgative medicine. Small doses (5 to 8 ounces) of linseed oil, with 1 ounce of chlorodyne, may be given every six or eight hours to keep the patient quiet, but hypodermic injections of morphia and atropine are most to be relied upon. Another remedy recommended is to cut into the right flank, pass the hand through the opening, and endeavour to find the cord and divide it, if possible; but this operation should only be attempted by a professional expert. In one case, that of a bullock, I passed my hand as far up the rectum as possible, and, when working along, felt a cord outside the bowel. I gave it three gentle pulls, when it broke. The animal got immediate relief, and did well.

308. Before going any farther, I must add a word of caution, which is, never to horn gruel into an animal recovering from an illness, as is too frequently done. If the patient will drink cold water, hay or nettle tea, milk, or oatmeal gruel, offer them frequently, and entice it to eat with all sorts of tit-bits of food—oat-sheaf for preference, wheat, or barley-straw, sliced potatoes, etc.—so as to induce chewing the cud, which the horning in of nutriment prevents, and therefore retards recovery. Again, while injections are very serviceable in bowel complaints in the horse, they are of

little or no use to cattle. In all ailments in cattle one very pronounced symptom is evident, that being the dryness of the muzzle.

309. **Diarrhœa**, or **Scour**, is *acute*, *chronic*, and *intermittent*, and a very common complaint in cattle. It is due to a variety of causes, such as eating frosted turnips, coarse indigestible or wet grasses, or from worms, liver flukes, and scrofula, or tuberculosis. Young cattle, coming two years old, suffer most, in which case a very common cause is turning them out on to grass in wet autumns, or on to oat-stubble, where the oats have been shaken and have germinated on the ground. These corn growths are very dangerous both to young cattle and sheep, and should be avoided, as they harbour the ova of intestinal and other worms. The crowns or shells of the temporary teeth not coming off at their proper time is also another great inducement to diarrhœa in young stock. The mouth should, therefore, be examined and the shells removed (*par.* 368). Worms—the *Strongylus contortus*, found in the lining membrane of the fourth stomach and intestines, and flukes found in the liver—constitute other chief causes of chronic or intermittent diarrhœa, as do also myriads of bacilli located in the lining membrane of the intestine, causing thickening and corrugation of the bowel, now known as Johnes' disease, a complaint that has been rife in certain districts for generations past. The animals are known as 'wasters,' but are quite free from tuberculosis, a thickened intestine and enlarged gall-bladder being found on post-mortem. The real nature of the malady has not been known until of late years, and although the animals feed and chew the cud fairly well, they gradually lose flesh, become hide-bound, and finally die from inanition. Young animals under twelve months old, as well as adult cattle, are affected, the malady arising from the animals grazing on certain wet, low-lying, undrained pastures—nursery-beds for the disease-producing germs, which have been left by previously affected animals, or been carried by floods or other agents. To destroy the germs the land should be dressed in spring or autumn with 5 to 6 cwt. of ground rock-salt to the acre, and McDougall's health-licks or lump rock-salt laid on the grazing-ground in various places for the animals to lick ; whilst for

PLATE XXIV



- A. The Egg of the Liver Fluke. 1. The Lid or Cap.  
 B. The Egg of the Fluke, containing an Embryo ready for Hatching. 1. The Cap or Lid.  
 C. The Ciliated Embryo of the Fluke boring into a Snail (*Limnaeus truncatulus*).  
 D. A Young Sporocyst dividing into Two.  
 E. A Fully-developed Sporocyst, showing a Young Redia. 1. The Young Redia.  
 F. A Redia, showing Mouth and Stomach.

treatment I have found nothing to equal 3 drachms of chloride of sodium (common salt), 1 drachm exsiccated iron, 1 drachm nux vomica, 3 drachms powdered quassia, mixed for one dose for an adult animal and given as a drench in gruel every other day, to which add 1 wineglassful of cod-liver oil and 30 drops of oil of cloves or creosote. A good, mixed, nutritious diet of corn, cake, bran, etc., should be fed to the patients. Young animals under twelve months old when turned out on to strong, wet, undrained lands in summer and autumn also suffer greatly from intermittent scour. **Derangement and disease** of the liver of various kinds are often also the means of producing scour. So, seeing that there is such a multitude of causes, it is of the greatest importance to the owner, as well as to the veterinary surgeon, to find *the cause*, and treat accordingly.

310. Upon no consideration should diarrhoea be stopped suddenly, as it may be due to some hidden ailment which Nature is trying to relieve in her own way. *Treatment.*—In the early stages 8 to 12 ounce doses of linseed oil, along with from  $\frac{1}{2}$  to 2 ounces each of chlorodyne and aromatic spirits of ammonia, may be used with great advantage, following it up with vegetable and alkaline tonics, while at times the preparations of iron are useful (*par. 1073, No. IV.*). Good nutritious food of an easily digestible character should also be given, such as crushed oats, bran, and linseed cake, milk, and linseed jelly, and upon no consideration should a small quantity of salt be omitted from the food at each end of the day. Where the affection is attributable to worms or flukes, small and repeated doses of oil and turpentine may be administered with great advantage (*par. 1074, No. I.*), and the lands should be dressed with salt.

311. **Liver Fluke** is a frequent producer of diarrhoea, and often with a fatal result, both in young cattle and sheep. As it is also the cause of a great amount of troublesome litigation amongst neighbours, a sketch of its character may not be out of place here. The liver fluke, or *Distomum hepaticum*, is of the Order Trematoda, or flat suckorial worms. It has a very interesting history, passing through seven stages, between fluke and fluke, six of which are accom-

plished outside the body of the sheep, or host (*Plates XXIV. and XXV.*, showing the various stages through which it passes). The flukes are bisexual, having both male and female organs in one body, and are generated from little eggs. These eggs are developed inside the parent fluke, which lies in the bile-ducts of the liver of the host, and are ejected from the parent by one of its openings and carried by the bile to the intestines, and there eventually carried, ejected, and deposited on the ground in the droppings. As many as 200 flukes have been counted in one liver, whilst the number of eggs generated by these has been reckoned at 7,400,000, or about 40,000 to each fluke. The eggs are about  $\frac{1}{180}$  of an inch long and  $\frac{1}{300}$  of an inch broad. Mr. A. P. Thomas's summary of the life-history is as follows :

'The adult fluke in the liver of the sheep produces enormous numbers of eggs, which are distributed with the droppings of the sheep. If these eggs have moisture, and a suitable degree of warmth, they continue to live, and in each is formed an *embryo*. The embryo leaves the egg, and swims in search of the particular snail, *Limnaeus truncatulus*, within which its future life and growth take place. The embryo bores into the snail, and then grows into the form which is called a *sporocyst*. The *sporocyst* gives rise to the second generation. This is known as *redia*. The *redia*, in turn, produces the third generation, which has the form of a tadpole, and is called *cercaria*. The *cercaria* quit the snail, and enclose themselves in envelopes, or *cysts*, which are attached to the grass. When the grass to which the *cysts* adhere is eaten by the sheep, or other suitable host, the young liver fluke comes out of the *cyst* and takes up its abode in the liver of its host, and the fatal circle is thus completed. It will be seen, therefore, that the fluke disease is one which alternates between a particular snail and the sheep. A sheep cannot take the infection *directly* from another sheep, nor can one snail take it *directly* from another snail. The sheep, by spreading the eggs of the fluke, gives infection to the snail, and the snail, in turn, by harbouring and distributing the *cercaria*, conveys the infection to the sheep.

'The conditions necessary for the existence of liver-rot in any given locality are as follows :

- '1. There must be fluke eggs on the ground.
- '2. There must be wet ground, or water, during the warmer weather, for the eggs to hatch in.
- '3. A particular snail, called *Limnaeus truncatulus*, must be present.
- '4. Sheep, or other animals, must be allowed to feed on the same ground without proper precautions being taken.

'If any one of these conditions remains unsatisfied, there can be no fluke disease or liver-rot in the locality.

'If the eggs of the liver fluke are to be hatched, they must be in water, or, at least, be kept moist, during some weeks of warm weather, or even some months if the temperature be lower. If the eggs are once thoroughly dried, their vitality is destroyed, the side of the shell being usually crushed in. A temperature of about 74° to 78° F. is the most favourable, and then the embryo is formed in about two or three weeks; with less warmth progress is slower, and with an average temperature of 60° the growth occupies two or three months.

'Ground is often, with reference to the "rot," spoken of as "sound," or, on the contrary, as "rotting." When the droppings, containing fluke eggs, fall on to a field, the rain will distribute the eggs over the surface, washing them down to the roots of the grass. If the soil be light or sandy, and porous, the land will be "sound," for the water will filter into the earth, leaving the eggs on the surface, where they will get dried, and so be destroyed. If, on the other hand, the soil is heavy and clayey, so that the rain-water does not sink into the ground, but flows along the surface, the ground is "rotting." For, as the water flows over the surface, it carries the fluke-eggs along with it, and deposits them in ditches, holes, marshy places, or furrows, where the water stands—all of them provinces where the eggs will hatch. The obvious remedy for this evil is to drain the land thoroughly and efficiently, and it will not only do much to prevent the rot, but will have the further advantage of greatly improving the herbage. Where it is not practicable to adopt this remedy at once, either salt or lime may be scattered over its surface with advantage. Both these substances destroy the embryos of the fluke, and, at a later period, the *cysts*, when attached to the grass; and, still further, they will destroy the snails, which serve as hosts to the intermediate stages of the liver fluke. The freedom from rot of sheep which are feeding on salt marshes is well known, and is now shown to be due to the poisonous action of the salt on the embryos, *sporocyst*, *redia*, *cercaria*, and *cyst*, and to its similar action on *Limnaea truncatulus* itself. Even a weak solution of salt and water ( $\frac{1}{2}$  per cent. of salt) proves fatal to this snail. Dressings of salt have the advantage over lime in not spoiling the grass for immediate use, whereas the latter will do so. It may, however, be better at times for the land itself that lime should be applied.

'There seems to be only this one snail in England which can serve as a host to the intermediate forms of the liver fluke. Consequently, wherever this snail is absent, there can be no liver-rot; and if we could succeed in exterminating it, we should render it impossible for the disease to exist in England.

'It is naturally of much importance that salt or lime should be distributed at the right time of the year, when fluke germs and snails are present in the greatest numbers. The snail buries itself in mud or soil in the winter time, and, owing to the cold, no embryos are hatched at that period.

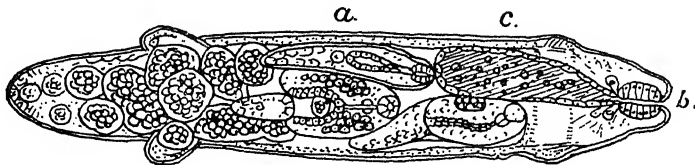
'If the weather be warm in April, it is possible that a few may be brought out towards the end of the month, but they will not be numerous. In May, however,



greater numbers may be hatched, and still more in June and July. These two months are the time of the year when the country is most liable to be infested by snails. As more eggs are distributed through the whole of the summer by fluked animals, it is clear, of course, that the production of embryos, though in less numbers, will continue from August until the time when the development is checked by autumnal cold. June and July, then, are the principal, but not the only, months in which we are to wage war against the embryos; the latter part of August, September, and October, are the months in which especially to destroy the germs on the grass ready for transference to the sheep.'

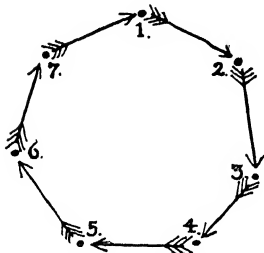
312. In the autumn, the snail *Limnaeus truncatulus*, just before going into its winter-quarters—i.e., burying itself in the mud—may become infested with one or more embryos, and, for the want of heat, their further development is arrested until spring, when the rays of the sun bring the snail to the surface of the ground, and the various transformation stages of the embryo fluke is then carried on, always provided heat and moisture are present. This, to my mind, is the greatest cause of the infection. The eggs deposited by the mature flukes in the liver, and again deposited on the ground in the winter months, are in great danger of being destroyed by the want of heat to germinate the embryo, as well as by the absence of its intermediate host, the snail, which is in its winter habitat. Sometimes, however, too many embryos enter one snail, and this results in not only the death of the host, but in their own as well. As may be inferred from the foregoing extract, the disease is not so rife in dry seasons, but is very common after wet summers. Animals may be affected as early as midsummer, but August, September, and October are the principal months for contamination; and as it takes ten or twelve weeks after the entrance of the *pupa* into the liver before any bad effects are noticed, December, January, and February are therefore the chief months in which flukes are to be seen fully matured. The fluke has been proved beyond all doubt to be a fresh-water creature, and, as mentioned previously, the disease is never met with on salt marshes. Therefore, the land should be dressed in autumn and spring with salt, the first application being to destroy the snails before they seek their winter shelter, and the latter to annihilate any who may have escaped the previous dressing, as they come to the surface of the ground; even a weak solution—viz., 1 ounce of salt

# PLATE XXV



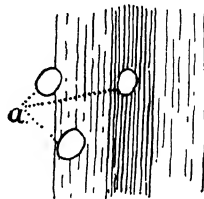
A Fully-developed Redia, showing—

a. A Young Redia. b. The Mouth. c. The Stomach.



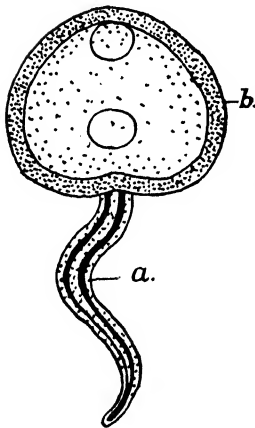
Represents the Life History of the Liver Fluke.

1. The Fertilized Egg. 2. The Ciliated Embryo. 3. The Sporocyst. 4. The Redia. 5. The Cercaria. 6. The Encysted Cercaria (Pupa). 7. The Full-grown Fluke.



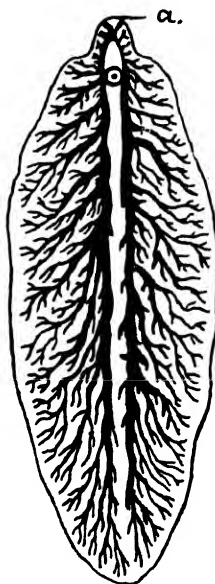
A Portion of Stem of Grass, showing—

a. The Cysts fixed to the same, each Cyst containing the Pupa of the future Liver Fluke ready to be swallowed by Sheep.



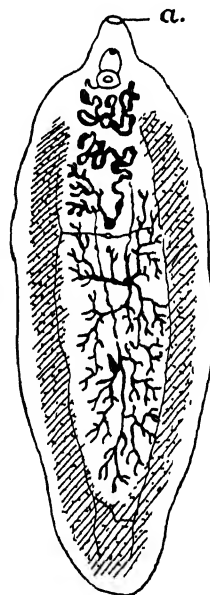
A Cercaria of Liver Fluke, showing—

a. The Tail, by which it swims. b. The Cyst or Envelope.



A Full-grown Fluke, showing the Digestive System, and—

a. The Mouth.



An Adult Fluke, showing the Reproductive Organ as Branches, and—

a. The Mouth.

to 5 pints of water—proves fatal. Salt should also be given in the animal's food. These precautions should be especially attended to after wet seasons.

313. **Dysentery, or Bloody Flux**, is an inflammatory action of the lining membrane of the bowels, accompanied by ulceration, and, in some cases, with extensive diarrhœa of a thin, bubbly character, mixed with blood and having an offensive smell, and is both *acute* and *chronic*. It is mostly caused by eating coarse food, grown on undrained and moorland pastures. At one time it was of very frequent occurrence in feeding bullocks, but of late years has not been nearly so common. Sometimes neglected or chronic diarrhœa may run into this complaint, and at other times it is a symptom of *tuberculosis*. *Treatment*.—Small doses of linseed oil and chlorodyne should be given, and to these may be added from 30 to 60 drops of oil of cloves, creosote, or carbolic acid (*par. 1065, No. I.*). Good, nutritious, and easily digested food is highly necessary, such as milk and linseed jelly to drink two or three times a day. As a rule, however, treatment is very unsatisfactory, yet I have had good results from the salt and iron medicine (*par. 309*).

314. **Peritonitis** consists of inflammation of the serous membrane, called the peritoneum, which lines the inside walls of the belly and covers the outside of the bowels, and also forms the net or mesentery. Injuries—the results of foaling, calving, lambing, or castrating, and wounds penetrating the abdominal cavity—are the principal causes of peritonitis, while, at times, it occurs without any appreciable cause whatever. This disease steals on so insidiously that the affected animal is generally at death's door before much notice is taken of it. This is especially noticeable in the horse, which generally dies in a few hours after being noticed. But the cow may linger on for a few days, having a dull, anxious look, with eyes red and suffused, hurried breathing (which is mainly done by the front ribs), moaning and grinding of the teeth, trembling of the limbs, and deathly coldness pervades the whole body. The animal, as it were, bleeds to death, owing to the watery portions of the blood oozing through the walls of the bloodvessels into the abdominal

cavity, which, on post-mortem examination, is found to contain a large quantity of straw-coloured fluid. When the disease is discovered hypodermic injections of morphia should be given, and cloths wrung out of hot water rolled round the body, covering these again with dry rugs and waterproof sheeting (*par.* 249).

315. **Dropsy, or Ascites**—*i.e.*, dropsy of the belly—may arise from *peritonitis*, from disease of the liver and bloodvessels, from *tubercle*, and other causes. It is not of common occurrence. The chief symptoms seen are enlargement of the belly, with swelling of the limbs. Good, nutritious food, with iron tonics and diuretics, should be resorted to (*par.* 1073, *Nos.* I. and III.), while, in some cases, it is necessary to 'tap' the animal.

316. **The Liver** (*Plate XVIII., B*) is a large, reddish-brown, glandular body, situated between the stomach and diaphragm, and held in its position by ligaments. It possesses four lobes in the horse and two distinct lobes in the cow, and is covered by a coating of peritoneum, called *Glisson's capsule*. The substance consists of small lobules, made up of cells, arranged like a cart-wheel, between which the capillaries run. The cells take out from the blood certain materials for the formation of bile. The bloodvessels of the liver are—

(1) The *hepatic artery*, which supplies it with nutrient blood.

(2) The *hepatic vein*, which conveys venous blood back to the heart.

(3) The *portal vein*, or functional vessel, which brings the blood, charged with absorbed material, from the stomach, spleen, pancreas, and mesentery. From this latter source portions of the bile elements are extracted, and the bile manufactured by the liver cells is then carried by the biliary tubes to the gall-bladder, and from thence by the hepatic duct which opens into the small intestine, close to the stomach. All animals, with the exception of the horse and rat, have a bag, called the **gall-bladder**, for the purpose of collecting and storing the bile—a viscid, greenish-yellow, and bitter fluid. Bile assists in the digestion and absorption of the nutrient material

in the intestines ; it also increases the peristaltic action of the bowels.

317. The liver is the largest organ of the body, but, while frequently the subject of a great amount of disease and disorder in human beings, it is, happily, not nearly so subject to derangements in the domestic animals. Like all other parts of the body, it is liable to inflammation. The symptoms are not very well defined, and diagnosis has to be arrived at by negative results. Such cases should always, therefore, be entrusted to professional care. Occasionally, on making a post-mortem, enormously enlarged livers are found, both in horses and cattle, which ailments the animals, when alive, gave no indications of. Sometimes, however, these enlarged, or *hypertrophied*, livers are accompanied in the horse by dropsical swelling of the legs and shortness of breath ; while in cattle the brisket, under side of the neck, and lower jaw become filled with a watery effusion. This latter symptom is also seen in traumatic heart disease in cattle. When cattle are heavily stall-fed with fancy foods, too highly seasoned with aromatic flavouring, and containing an excess of *amylaceous* matter, such as damaged rice, starch, sugar, etc., or where there is a preponderance of carbonaceous over nitrogenous principles—in other words, a badly balanced food—the liver is apt to undergo *fatty degeneration* or *fatty infiltration*. In the former the liver cells become changed into material of a fatty nature, while in the latter fatty globules are deposited in the cells. These cases may be *subacute* or *chronic*. *Symptoms*.—The animal refuses its food, drinks large quantities of water, and soon becomes greatly emaciated, but rarely hide-bound (although the hair looks staring and on end), and is affected with a lead-coloured, exhaustive, and stinking diarrhoea. *Treatment* is very unsatisfactory, a fatal termination usually supervening. Chloride or bromide of ammonia, with carbonate of soda,  $\frac{1}{2}$  ounce each, night and morning, may, however, be tried. The liver is liable also to *rupture*. This may be occasioned by engorgement and congestion of the portal vein, but in the horse it is more often due to the effects of falling in jumping. As a rule it proves fatal. In these cases the mucous membranes become pale

and blanched; there is a running-down pulse; then muscular twitchings supervene, the legs and body get icy cold, and death soon follows. The liver is also a frequent seat of tubercular deposits, abscesses, and tumours, as well as atrophy.

318. **Jaundice**, or 'yellows,' arises from many causes, but is generally looked upon as a symptom of some derangement of the liver, such as congestion, obstruction in the bile-ducts, loss of tone, and consequently inability to secrete the bile. **Congestion** is one of the most frequent liver disturbances met with in horses and cattle. It generally occurs in hot, dry seasons. The animal becomes sluggish, languid, and lazy, drops the head, loses the appetite, but evinces no pain. The pulse is full, slow, and soft; eyelids and gums of a dirty yellow or orange colour; tongue furred; breath foetid; bowels costive; fæces of a light slate colour; while in some cases in the horse the animal goes lame on one fore-leg, usually the off (right) one. Cattle are, however, more subject to this complaint than the horse, and the dirty yellow or orange colour can be readily noticed in the corner of the eye or inside of the ear, on the udder, under the tail, and, indeed, on any white part of the skin or any visible mucous membrane, particularly the vagina. The belly is flat, the appetite bad, and the animal rarely chews the cud. *Treatment*.—A good dose of opening medicine should be given at first. One drachm of calomel, suspended in from  $1\frac{1}{2}$  to 2 ounces spirits of nitre, and 1 pint of linseed oil may be given with advantage, either to horses or cattle, followed up by alkaline and vegetable tonics (*par.* 1073, No. IV.). Cattle also occasionally suffer from the presence of the dead bodies of the liver fluke which have undergone calcareous degeneration, and fill the bile-ducts of the liver with incrustations, accompanied by enlargement of the gall-bladder and a thickening of the walls of the bile-ducts, rendering the liver hard and gritty, and thereby interfering with its function. *Symptoms*.—A general yellowness is seen all over the body; the skin is tight and scruffy, with gradual wasting away of the flesh; the appetite and action of the bowels are both very irregular, and the animal has all the appearances of a pinner or a tubercular patient. *Treatment* is of little avail,

and if not slaughtered early the animal dies from inanition. Alkaline tonics can be tried, with daily doses of 1 wineglassful of cod-liver oil given in milk.

319. **Gall-Stones.**—These are extremely rare, either in horses or cattle. Some years ago I had a case at the late G. T. Carr's, then at Silloth Farm, Cumberland, the subject being the hunting sire 'Best Returns.' It commenced with all the indications of subacute inflammation of the bowels, with severe colicky pains. The acute symptoms were got over, and the case settled down into a chronic form, and for fully five or six weeks the bowels were very irregular—sometimes slightly purged, and at others only costive, dry, hard, primrose-coloured pellets being excreted. At length it was seized with all the symptoms of uræmic poisoning, the head being pendulous and oscillating; fore-feet stiffly pushed forward, and legs occasionally bended at the knees; hind-legs placed wide apart; pulse very full, with slight colicky pains, and if made to move, it tumbled against the side of the box, which had to be padded with sacks of straw. Bleeding had a wonderful effect, and was frequently resorted to; in fact, it was the only thing which gave any relief. At last it was found dead in the box, and the post-mortem showed a gall-stone of a beautiful chrome-yellow colour, about the size of a pullet's egg, situated in the hepatic duct, close to its opening into the intestine. It was made up of concentric layers of a very delicate nature, which fleeced off on the slightest touch.

320. Liver complications are more common *in the dog* than in any other of the domestic animals, more particularly the overfed petted dog, that is being continually stuffed on sweet and fancy foods, which are apt to set up various derangements and diseases of the liver, such as congestion, enlargement, hardening, scirrhus, etc., and which creep on very insidiously, being frequently accompanied with asthma and shortness of breath. *Symptoms* of the different forms of liver complication in the dog are not well defined. The first symptom generally to be noticed is that the skin and coat begin to look dry and harsh, the mouth and the tongue lose their bright rose colour, the breath becomes fœtid, and the eye is dull and sleepy-look-

ing, while the teeth are dirty. The appetite, however, is fair, yet the dog loses flesh, and the belly becomes enlarged and hard, while there is nearly always present a peculiar barking, long, husky cough. *Treatment*.—First all fancy foods should be stopped and a plain diet given, such as dog-biscuit steeped in soup, feeding twice in twenty-four hours, and giving gentle walking exercise. For medicine, mix 1 drachm each of blue pill, powdered aloes, and powdered rhubarb, and make into twelve pills, and give one every third or fourth day. This dose is for an ordinary-sized collie dog; other doses should be regulated according to age, breed, and size of dog.

321. **Pancreas**.—I have never as yet met with any disease of this organ, either in post-mortems or otherwise, except in tubercular disease.

322. **The Spleen, Milt, or Cat-Collop** (*Plate XVIII., E*), is situated on the left side of the larger curvature of the stomach. It has a bluish-grey, mottled appearance (in the pig slightly red), shaped like a sole, and is very soft and elastic. It is ductless, having no channel for the removal of its products, except by means of the bloodvessels. Its proper functions are not exactly known, though several are ascribed to it. Still, it can be done without, as cases are on record where the spleen has been successfully removed from dog and man without causing death, or, indeed, much inconvenience, so long as the diet was properly attended to. My opinion is that it acts as a reservoir for the old worn-out red corpuscles which have done their duty in the blood. These, rushing to the spleen during digestion, are broken down, disintegrated, and carried by the splenic vein into the portal vein, thence to the liver, and help to form bile (see Lecture VIII., 'Circulation'). The spleen is supplied with blood by the splenic artery—a branch of the **cœliac axis**, which is a large artery that arises from the posterior or abdominal aorta, just after it passes through the diaphragm. This artery divides into three branches: (1) The *gastric artery*, supplying the stomach; (2) the *hepatic artery*, supplying the liver; and (3) the *splenic artery*, which supplies the spleen with nutrient blood. Although the spleen can be done without, it is a very dangerous organ when diseased. Some-



times, in the horse, it reaches an enormous size, without, however, showing any appreciable symptoms during life. *Fig. 6, page 158*, is from the photo of the spleen of a horse that was slaughtered after a long and wearisome illness. The animal had been ailing for months, and unable to work, and although feeding fairly well, it gradually lost flesh. Spleen disease was suspected, and, after slaughtering, the organ was found of an enormous size and studded all through with tubercular nodules of various sizes.

323. **Lymphadenoma.**—This is a peculiar disease of the spleen in the horse. The symptoms are very remarkable: the animal feeds well, but gradually loses flesh; has a dingy, staring coat and a staggering, swinging gait. The visible mucous membranes, such as eyelids, etc., are as pale as white paper; the pulse is soft and quick, varying from 80 to 90 per minute; the bowels, as a rule, are quite normal. The animal lingers on for some considerable time, having to be supported on slings to keep it on its feet. These cases are invariably fatal, the post-mortem showing the presence of pearly-white tumours of lymphoid tissue, and varying in size from that of a marble to that of an orange, made up in concentric layers which are studded through the spleen, while at times the lymphatic glands are also implicated. *Treatment* is of little avail, but 1 drachm each of iodine and sulphate of iron made into a ball and given once a day till eight doses are given can be tried, and repeated if necessary.

324. **Anthrax** is a specific disease of a very inoculative and contagious character, caused by the presence in the blood of a spore-bearing organism, the *Bacillus anthracis*. From time immemorial outbreaks of anthrax have been recorded by celebrated men in various parts of the world at different periods. *Anthrax* or *splenic apoplexy* as it affects cattle is known by the name of *malignant pustule*, or *woolsorter's disease*, in the human subject. Other terms are also applied to the disease, such as *charbon*, *carbuncular fever*, *gloss anthrax*, *malignant sore throat*, etc. In South Africa it is called *horse sickness*, in America *Texan fever* and *splenic fever*, and in India *Loodiana disease*. It is very remarkable to observe how solitary cases of anthrax break out in this country, arising, as they do, under such

a variety of conditions. For instance, the process of fermenting hay-chop, if not properly and carefully carried out, my experience shows to be very dangerous. This process consists of saturating chopped hay with cold water, or cold water and treacle, mixing it with sliced turnips, and letting the mixture lie until fermented—that is, until the starchy matters have been converted into their sugary form. Should this, however, be carried too far—viz., through the sugary to the acetous stage (and this is easily done by leaving some of the old chop and mixing it with the new—a little leaven leaveneth the whole lump)—and the cattle be fed on this for any length of time—a fortnight, or even less—bad results generally follow, more particularly if some food rich in nitrogen, such as decorticated cotton cake, has been added to the mixture. I have, on several occasions, known anthrax to have followed this method of preparing the food and feeding, and, on changing the food to a simple diet, the malady was always arrested. On other occasions anthrax followed the feeding of cattle with overmacerated cummings, left too long exposed to the action of the atmosphere, when they were rendered as sour as vinegar. Whether the method of manipulating the food renders it into such a condition that when eaten it has some peculiar action on the fluids and solids of the body, whereby they are converted into a suitable pabulum, or seed-bed, favourable for the entrance and development of the spores of the disease, or whether the spores are in the foods and are roused into activity by the methods of preparation, I am unable to say. Again, on the other hand, several outbreaks have also occurred in my district on undrained pasture-lands. On one occasion, in 1862, the complaint broke out amongst twenty-five two-year-old short-horn heifers, of which six died in two days, and they were only ailing from two to four hours; the remaining nineteen were removed to another pasture, and each one got a dose of medicine, composed of 6 ounces each of common salt and Epsom salts and 2 ounces of ginger in 1 quart of thin gruel. A few days after sixteen of the heifers took red-water, but they all eventually did well, and the disease spread no further. The land on which this outbreak of anthrax occurred had been noted for generations as a hot-bed for red-water in cattle. For twelve years after red-water was prevalent, but no anthrax.

In 1874 the pasture was dressed with 8 hundredweight crushed rock-salt to the acre, and again in 1880 it got another dressing, *but no cases of red-water or anthrax have been seen since the salt was first applied.* I have also seen a number of cases of anthrax, the cause of which was set down to eating mouldy cotton cake, particularly undecorticated, which should never be stocked during the months of June to September, for it is very apt to mould, and is then highly dangerous, and it is just possible that the anthrax spores (seeds) may have been lying latent in the mouldy cake, and brought into activity on consumption by the cow.

325. As already stated, this disease is due to the *Bacilli anthracis* (minute rod-like bodies); yet these little organisms are not found in the blood until an hour or so before death, although they may be present in the spleen and other internal organs. The bacilli, or rods, as seen in a fresh unstained drop of blood under the microscope, are noticed to vary in length, being estimated to be from  $\frac{1}{1700}$  to  $\frac{1}{2000}$  of an inch long and  $\frac{1}{25000}$  to  $\frac{1}{30000}$  of an inch broad, but with rounded ends, and having all the appearance of minute splinters of glass mixed amongst the blood corpuscles. When stained with methylene blue the rods are readily seen like small portions of black thread amongst the corpuscles. The anthrax bacilli, being aerobic, require for their development and growth a large quantity of oxygen, and in the living body they multiply by transverse division or fission—breaking into two—increasing with great rapidity, and thus robbing the blood of its oxygen, which becomes watery and dark coloured, and the bacilli crowd into the minute bloodvessels—the capillaries—block them up, and the animal dies suddenly, as if suffocated for the want of oxygen. When experimenting outside the body, and the bacilli are placed in a suitable nutrient material and at a proper temperature, they develop very quickly and form a sort of chain-like filament, and, when supplied with oxygen, generate spores or seeds for the next generation; and as an illustration, a pea-pod full of peas may be taken, the pod being likened to the bacilli, while the peas resemble the spores or seeds. As the spore formation also requires a large quantity of oxygen, it rarely takes place inside of the body;

but when an animal that has died from anthrax is skinned or opened into, and the blood and tissues exposed to the action of the air, spore-development readily takes place, and as they are the real seeds of the disease, it is, therefore, dangerous to open the dead body of an anthrax subject—it tends to spread the malady. However, should the body be buried intact, in the space of from three to five days after death, the *putrefactive bacteria* of the body destroys all the existing anthrax bacilli, and further danger is averted. The bacilli themselves can be destroyed by excess of heat or cold, or chemical agents, but the spores are difficult to deal with; they can withstand almost any amount of heat or cold, and can lie for years in the soil without their virulent nature being affected.

326. *Symptoms*.—Cattle are more frequently affected with anthrax than any other animal; the disease may be per-acute, acute, or sub-acute. The **per-acute**, or apoplectic form, is very sudden in its action: the animal becomes suddenly ill, staggers and tumbles about, with occasional bloody discharge from the nose, mouth, and rectum, and may die in the short space of an hour in convulsions. These are the cases that are usually seen apparently all right, say the last thing at night, and found dead in the morning. The **acute** form is not so pronounced, and generally occupies three or four hours before running its course. When observed, the animal is noticed to be very uneasy, trembling all over, breathing very fast with a loud noise, mouth open, and saliva foaming from the lips, the beast shaking and reeling from side to side, and finally dropping down and dying suddenly. In some cases the throat is also swollen, this symptom being mostly observed in the pig. The temperature runs from  $106^{\circ}$  to  $108^{\circ}$ , and occasionally blood is seen coming from the nose and bowel. The **subacute** form is characterized by the animal being found standing very quietly and thoughtful-looking, hanging its head, with occasional trembling of the muscles, breathing fast, with tears running from the eyes, refusing all food and water, and the cessation of the secretion of milk when the subject is a milch cow. The temperature varies from  $104^{\circ}$  to  $106^{\circ}$ , diarrhoea may be present, and the animal, having all the appearances of a severe cold, may continue in the

same condition for two or three days and ultimately recover. It is only in these latter cases that there is any chance of recovery. When an animal is found dead in the byre or field, and very much swollen, with the rectum slightly turned out, and a bloody, watery discharge oozing from the various openings of the body, on no account should it be either skinned or opened into, as on examination of these discharges, from an anthrax subject, under the microscope they are found loaded with bacilli. In all such-like cases a drop of blood taken from the tail or ear should be microscopically examined, when the anthrax rods will be readily observed amongst the red

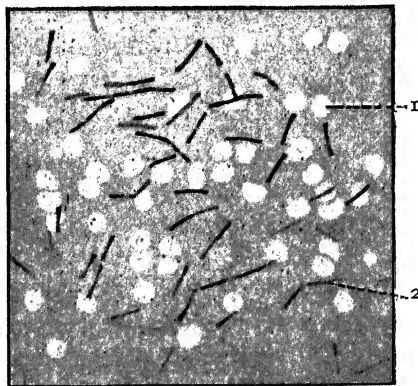


FIG. 11.—ANTHRAX BACILLI AND RED CORPUSCLES.

1. Red corpuscles of blood.

2. Anthrax bacilli rods.

corpuscles of the blood. This can be further verified by adding a little methylene blue to another drop of blood, when the dark rods, or the bacilli, will be seen (*see Fig. 11*). No time should then be lost in informing the nearest police officer of the case, while all the openings into the body of the animal should be immediately plugged up with pieces of cloth saturated with some disinfectant or tar and a sack pulled over the head, while the body must be protected from the approach of other animals. Should the carcass have to be buried, the hole must not be less than 6 feet deep, and dug in some remote place clear of drains and watercourses. A plantation makes

a capital burial-ground. The bottom of the grave should have a layer of lime mixed with carbolic acid spread over it, and all the bedding and other articles that may have been in contact with the diseased beast should be put into the grave along with the carcass, and then another layer of lime and carbolic acid spread on the top. By far the best way for disposing of the carcass of an anthrax beast is to burn it, and the bedding, also, and this method is now generally adopted by the local authorities.

327. It will thus be seen that the carcass of a dead animal should on no account whatever be disturbed until the cause of death has been ascertained; nor ought any beast, when found to be very ill, and apparently at the point of death, be slaughtered and dressed, as is too frequently done, because if it be a case of anthrax it is extremely dangerous to the men who take part in the work of skinning and dressing, and at the same time it tends to spread the malady by exposing the blood and flesh to the air, and thus favouring the development of the spores or seeds of the disease, which can be carried about on the clothes and shoes of the attendants, also on the feet of dogs, cats, poultry, vermin, etc., into and amongst the fodder and other feeding-stuffs; it can also be conveyed by utensils that may be lying about—these are considered to be the worst forms of spreading the contagion. Foreign cakes and meals and other feeding-stuffs, particularly those that have been damaged in transit, are looked upon with great suspicion, as are also foreign bones, hides, and wools, the latter being considered as highly dangerous in contaminating the vessels and vehicles by which they are carried. It is, in addition, recorded that the disease-producing spores are brought from the dead carcass of an anthrax beast that has been buried some years previously without any precautions being taken to disinfect the body, and deposited on the ground in the worm-casts, and thus contaminate the herbage. However, notwithstanding all these theories, there is only one real cause of anthrax, and that is the entrance into the body of a subject of the bacilli or their spores; that body must be, however, in such a condition as to favour the acceptance and development of the disease-producing organisms, and this state

may be induced by injudicious feeding with an excess of food of either too nitrogenous or too carbonaceous a character, a badly-balanced ration, and food not properly prepared or overfermented. It is, nevertheless, very remarkable that, in spite of all the foregoing causes, only solitary cases keep cropping up here and there; and when every precaution is taken to deal with the carcass, the disease seldom spreads, as anthrax cannot be looked upon as infectious—that is, healthy animals standing in close proximity under one roof, or in the same pasture, do not take the disease by inhalation. Anthrax occasionally makes its appearance in an enzootic form on low-lying, undrained, sour, marshy pastures that may be adjoining rivers subject to overflowing; these cases can only be accounted for by the spores being brought by the flood from an infected quarter and deposited on the grazing pastures.

328. *Treatment*.—When the symptoms are noticed and anthrax suspected, 4 ounces of hyposulphite of soda dissolved in a quart of warm water, with 1 ounce of tincture of ginger added, should be administered as a drench, giving 10 to 12 ounces of raw linseed oil and 2 drachms of British Pharmacopœia carbolic acid mixed four hours later, and repeating half the quantities of these medicines alternately every four hours until the bowels respond, offering at frequent intervals cold water or cold hay-tea to the animal to drink. This mode of treatment I have on several occasions found very satisfactory. As a rule all in-calf cows that have been affected with anthrax and recovered under treatment cast their calves (abort). *Post-mortem*, when the skin is removed from a beast that has died from anthrax a peculiar sickly, musty smell is given off, while the carcass is noticed to be of a yellowish-grey colour, and small drops of dark semi-fluid blood is noticed coming from the cut ends of the small bloodvessels, and the flesh and all internal organs, such as the heart, liver, etc., have a soft, half-boiled appearance; the spleen is very much enlarged, being eight to ten times its normal size, of a dark brown colour, readily broken through, and full of tarry-like semi-fluid blood; while the cavities of the belly and chest, bladder, etc., contain a dirty mud-coloured fluid. Regarding preventives, I have every confidence that

if the lands are well dressed with salt, and the animals given a tablespoonful of salt daily in their food, which should be properly prepared, this disease would in a great measure be prevented.

329. **Braxy, Sheep-Sickness, Strike, etc.**—Braxy may be looked upon as a morbid change in the tissues of the body and deterioration of the blood. From numerous investigations, experiments, and microscopic examinations by the late Professor Hamilton, M.B., F.R.C.S.E., of the Aberdeen University, and others, appointed by the Board of Agriculture and Fisheries, and according to the Report issued by them, there are several other complaints as well as wet, dry, and red braxy to which sheep are prone that are called braxy; it also appears that braxy proper is considered to be due to the presence of a disease-producing germ, and is of an enzootic character, having an extensive range in certain localities, making itself manifest at certain periods of the year, particularly in the later autumn and winter months, and attacking young sheep, chiefly under twelve months old. It is further stated that the specific bacillus—a spore-bearing germ—was discovered by Neilson in Norway in the year 1888, which discovery has been confirmed by Professor Hamilton in his extensive researches, who also considers that the Gulf Stream has some influence on the prevalence of the disease. The experts report that braxy in sheep, like louping-ill (*par.* 595), is due to small germs (bacilli) found in the cavity of the belly (peritoneal cavity) and inside of the bowels, and also in other serous cavities, as well as in the blood, but the braxy bacilli differs from all others by being very small and of a delicate outline. Apparently the disease is spread by the bacilli which infest the bowels being deposited on the ground in the excreta of an infected animal, and picked up with the herbage by healthy sheep. When the skin is removed from the dead body of a braxy sheep the carcass gives off a very peculiar odour (braxy smell), and when the flesh is pickled in the brine-tub and dried it is called 'brakshay,' and is much relished by many, having a somewhat venison-like flavour. The investigators found from numerous experiments that by preparing a soup from the disease-producing germs found in the cavity of the belly, and administering it to the lambs at a certain



time of the year, the animals were supposed to be rendered immune, and the disease prevented. The administration of this prepared soup has not, however, given such a satisfactory result as was anticipated, and the real pathology of braxy has still to be determined. The same investigators, however, found that at certain times of the year—July and August—the blood itself had a remarkable power of destroying the germs of both louping-ill and braxy, and this was the time of the year to dose the animals with the prepared soup in order to prevent them taking the diseases at the time when they were most susceptible to its influence—namely, from October to January. A favourite preventive of the malady with a large number of flock-owners is a preparation of the dung of pigs and skim milk, a wine-glassful of this being administered to each sheep in the third week of September; one dose is said to render the sheep immune from the complaint. Lump rock-salt or McDougall's health-licks placed on the pastures for the animals to lick give the most beneficial results—except dressing the grazing lands with 6 hundredweight crushed rock-salt to the acre.

330. In some seasons when sheep are first folded on turnips they are affected with sickness, which somewhat resembles braxy in its attack, and is very rife, the sudden change of food, and some peculiarity in the weather, having a powerful influence in producing it. When sheep are first put on roots, they should have a small quantity of hay, well watered with salt and water, or a little salt given daily with some crushed oats or maize and bran. Were these measures generally resorted to, there would be little, if any, fear of the sickness appearing. When the malady occurs amongst lambs on extensive mountain and hill ranges, lump rock-salt placed on various parts of the pastures will be found to have a very beneficial effect. *Treatment.*—As the disease runs its course so rapidly, there is little or no chance for medical treatment; if, however, the case should be noticed early, then 3 to 5 drachms of hyposulphite of soda dissolved in  $\frac{1}{2}$  pint of warm water, to which may be added 5 to 15 drops pure carbohic acid, and 1 to 2 teaspoonfuls of tincture of ginger can be given, and repeated in four hours if necessary.

331. **Mesenteric Disease.**—The mesentery, or net, in well-bred cattle, is often the seat of abscesses, or tubercular nature, and such animals go under the name of etc. The skin has a dirty yellow, scurfy appearance, over the body, and hide-bound ; there is also great emaciation, rumen, diarrhoea. Little can be done in these cases, medicine has little or no effect. Sometimes, however, on the first appearance of this disease, from 10 to 25 drops of strong sulphuric acid diluted with cold water may be serviceable, along with a wineglass of sweet oil or linseed oil daily. The most profitable plan is to give animals with tuberculin, and although they react, in some cases it has a marvellous action, the disease is arrested, and the animal commences to improve and get well ; but should this not succeed, then make away with them. *Milk from such animals should not be sold or used.*

332. **Calves.**—As already stated, the fourth stomach is the largest in the calf, on account of the young animal living on a milk diet. The first, second, and third compartments are required to prepare the food until the animal begins to eat other rough material. The fourth stomach of the calf contains acid juices (the *rennet*, used in cheese-making), which has the property of coagulating milk. This fact is of great importance in the feeding of calves, showing that they should be fed with small quantities for the first fortnight, at least, and ought not to be fed less than four or six times a day, although farmers feed them only twice a day, giving large quantities. This practice is much to be condemned, for, as soon as milk comes in contact with the walls of the stomach, it is coagulated, this being the first process of digestion. The weakness of the calf is quite unfitted for disposing of a large bulk of food ; and perhaps some of the old curd is still in its stomach when it is fed. This sets up irritation and inflammation of that organ. Nature tries to relieve by means of diarrhoea, called *white scour*.

333. **White Scour** is a discharge from the bowels of a white or yellowish coloured watery fluid, and due to the presence of

a disease-producing organism, and of a very infectious and contagious character, being readily carried by an affected calf from one building to another—a complaint which carries off a large number of calves yearly, and when once established is difficult to deal with, running through the young stock in many cases like an epidemic, varying in degree in accordance with the severity of the attack and the constitution of the animals, making itself manifest in three different forms. The late Professor Nocard, the noted French savant, in conjunction with Professor Mettam, when inquiring into the great mortality amongst the calves in Ireland in the year 1901, reported that the malady *white scour* in calves was caused by the presence of a microbe which Professor Nocard isolated from numerous other microbic germs, and named it *pasteurella*; he also proved by direct experiment that *joint-felon* (septic arthritis) was due to the same cause, and that the germ gained admittance into the body of the calf at its birth through the medium of the navel cord, which is made up of four vessels (*par.* 760). In many cases, a few weeks after the calves recovered from the diarrhoea, they were noticed to be affected with a bad cough, accompanied by a gradual loss of flesh, general debility, and eventually death, and the post-mortem showed the lungs to be highly inflamed and consolidated. This form of the complaint I have frequently met with in my practice.

334. *In the first or catarrhal form* the malady is of a most virulent type, attacking the young calves immediately they are born, and running its course in from three to twenty-four hours. In many instances the calves die before ever getting a drop of milk, giving the impression that they bring the disease into the world with them; they pass from the bowel with great pain and straining a most irritating fluid of a hot, bloody, watery nature. *In the second form*, calves with stronger constitutions and a less severe attack show no signs of the complaint until about the time the fifth or sixth meal of milk is offered, which the little animals refuse, and a yellowish bilious discharge is ejected from the bowels, and within a few hours the calves will be found lying stretched out and greatly depressed, with eyes closed, mouth and body cold, breathing very

catchy, and finally death closes the scene. *In the third form* the attack is of a much milder character, the calves being affected several days and then recovering. Cases in the second and third forms are at times greatly aggravated by injudicious modes of feeding, giving big doses of milk at the end of each day instead of lesser quantities four or five different times within the twenty-four hours. The calves should be fed from an india-rubber foster-mother, and suck the milk instead of drinking it.

335. *Treatment*.—In the first or intestinal catarrhal form the attack is so severe that little can be done; 2 teaspoonfuls of Condry's Fluid, mixed with  $\frac{1}{2}$  pint of skim milk and warm water, can be tried, and repeated in five or six hours if required. In the second and third stages sometimes 2 to 3 ounces of castor oil and 1 to 2 teaspoonfuls of laudanum mixed and given as a drench in a little warm milk, when the animal is first observed ailing, answers well, following up with 1 wineglassful of lime-water, or 1 teaspoonful each of carbonate of soda or salicylate of soda added to the morning and evening meal. Should the diarrhoea be very bad, give as a drench in a little warm milk 1 tablespoonful of Gregory's powder (*par. 1065, No. III.*) and 1 teaspoonful of laudanum night and morning, the milk fed to the calves to be twelve hours old with the cream removed, warmed in a water-bath, and offered to the ailing animals every five or six hours in small quantities. The calf huts and boxes should be at once thoroughly cleaned out, the walls and wood-work washed with boiling water, washing-soda, and carbolic acid, following this up with lime-wash and carbolic acid, sprinkling the same on the floor; this ought to be done once a fortnight or three weeks until the complaint is arrested. *Prevention*.—Immediately the calf is born tie the navel string with a piece of cord or narrow tape previously dipped in carbolic oil (*par. 1060, No. III.*, or iodine solution, *par. 1069, No. V.*), then rub a little of the oil or iodine solution over the belly and around the navel, and above all put the calf into a good dry box on to clean dry bedding, and for the first week feed every six hours with twelve-hours milk (from which the cream has been removed) warmed in a water-bath. Attention

should also be given to the food of the cows, and if decorticated cotton cakes or other highly nitrogenized foods are being used, they should be stopped for a few weeks before and after calving, and crushed oats, brewers' grains, Indian meal, and bran used instead. The nitrogenous matter in cotton-seed cakes causes the milk to be of too stimulating a nature for a young calf's system to assimilate.

336. **Hair and Wool Balls** are accumulations of hair or wool in the stomach of the young calf and lamb. They may be caused by the animals licking and sucking one another, by which means a quantity of hair and wool is drawn into the mouth by the tongue, whence it is passed on to the stomach, where, by the churning motion of the stomach, it becomes matted and formed into balls. Another cause is that of giving the calf unstrained milk, which is a great mistake. Milk given to calves should always be put through a strainer. When these balls are present, they cause a good deal of derangement, with impaired appetite and a puffing up or swelling of the left side. Should the swelling occur several times daily, the best plan is to make the animal into veal or lamb as soon as possible, or the stomach may be cut into and the offending ball removed. Occasionally a calf may recover, in which case the ball or balls, highly polished, are found in the paunch of the adult animal on slaughtering, having been a frequent cause of tympanites during life.

337. **Navel-Itis** is a septic inflammation of the navel string, with suppuration, caused by small germs infesting the navel opening, and a common complaint in young foals, calves, and lambs up to a week or fortnight old. The animal appears dull and listless, lies stretched out flat on its side, refuses its milk, and breathes fast and catchy, perhaps moaning. On examining the navel it will be felt to be hard and swollen. It should be laid open with the knife, and dressed with carbolized oil or iodine solution (*par. 1060, No. III.*, and *par. 1069, No. V.*); a flannel folded five or six ply thick, wrung out of hot water, should then be applied to the navel, and kept in place with a bandage round the body. Tablespoonful doses of Gregory's powder or magnesia may be given daily. *Prevention.*—Dress the navel string as per instructions given under White Scour.

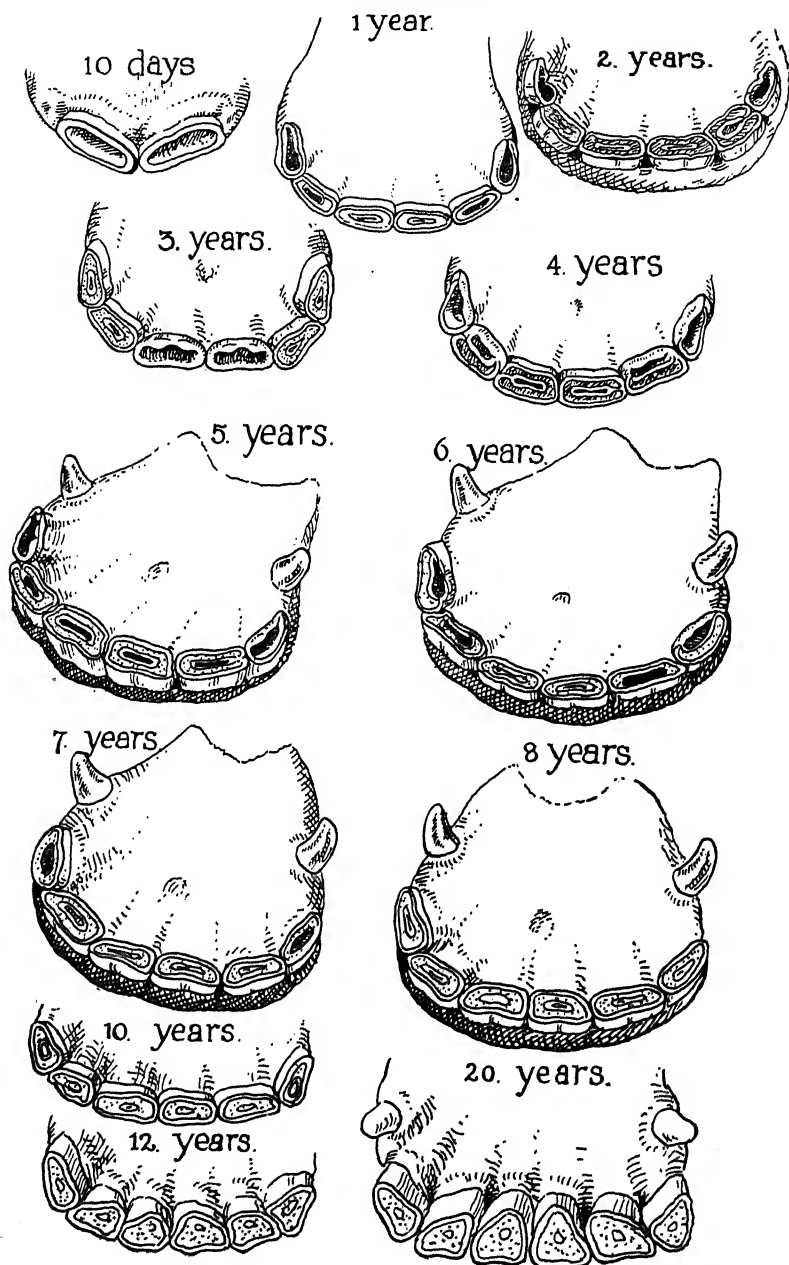
338. **Joint-Felon**—a septic inflammation of the joints. The knee, hock, and stifle are the joints most frequently attacked by its baneful action, and it is usually noticed a few days after birth. A large number of young animals are yearly lost from this disease. The patient is very feverish, and unable to stand when put on its feet, while, on being made to move, lameness is noticed in one or more of its limbs. There is enlargement of the joints, accompanied by great pain on pressure being applied. As a rule the disease is fatal. On opening the diseased joints, they are generally found to contain a quantity of *sanious* brown stinking fluid, in which are shreds of tissue. The disease is due to septic material being carried into the system through the four vessels that form the navel string (*par.* 760), which in most cases are found to be open, and from which there is a slight discharge of thin watery fluid; consequently, as a preventive, I strongly recommend that at all times the navel string be tied immediately after birth with a piece of cord dipped in carbolized oil or iodine solution (*par.* 1069, *No. V.*), or a waxed thread as used by shoemakers; above all, the box in which the mare foaled, or the cow calved and cleansed, should be thoroughly washed out with water containing carbolic acid. Clean dry bedding is an absolute necessity. *Treatment* is extremely unsatisfactory; rubbing the affected joint with 3 ounces each of essential oil of camphor and soap liniment and 2 ounces of liquid extract of belladonna mixed, and a little applied twice a day, 1 to 2 drachm doses of hyposulphite of soda, with 5 to 10 grains of sulphate of quinine added and given in a little milk or water, every six or eight hours, answers as well as anything I have tried.

### SHEEP.

339. Many of the ailments affecting the digestive organs of the cow are seen in the sheep, and the *treatment* is somewhat analogous, only the medicine used must be about *one-fourth* less than what is given to the cow.

340. There is, however, one very complicated affection that deserves special attention, and that is *verminous* or *parasitic bronchitis*, or *hoose*, accompanied by *diarrhæa*, or scour, and known in some parts as *paper-skin*. The *diarrhæa* has already been described (*par.* 309),

PLATE XXVI



and the *hoose* will be further noticed in *par.* 548. This complicated disorder is mostly seen in lambs that have been moved from one place to another during the months of August and September, and generally makes itself manifest in and from October till December. The disease is due to the presence of the *Strongylus filaria*, a small white thread-like worm found in the wind-pipe and bronchial tubes, causing *verminous* or *parasitic bronchitis*, accompanied by *hoose* or cough. These worms, when numerous, are quite sufficient in themselves to cause death, setting up, as they do, inflammation and consolidation of the lungs; but when accompanied and complicated by the presence of other worms—*Strongylus contortus*—infesting the lining membrane of the fourth stomach and bowels, and setting up an extensive and exhaustive diarrhoea—*i.e.*, scour—the matter is then very serious. This complication causes great pain and induces the affected animals to drink large quantities of water, there is rapid emaciation, and death soon follows.

341. The lambs pick up the ova or eggs of these worms on unsound or contaminated pastures, and a few hours is quite sufficient to infect a whole flock. This is a matter of vast importance to both seller and buyer, as both may have good sound grazing lands, and yet the lambs may contract the malady in transit from one place to the other by being put on to an unsound grazing pasture for a few hours' rest on their journey, particularly in August and September. *Treatment* must be energetic so as to kill the worms in the lungs; for this purpose, fumigations of sulphur, chlorine, or iodine fumes can be used. The stoving should be repeated about every third or fourth day, while the strength of the patient must be maintained by good, nutritious, and easily digestible foods, such as linseed jelly, milk and eggs, gruels, etc., to which should be added 10 to 15 grains of exsiccated iron and 1 dessert-spoonful of common salt once a day, also a dessert-spoonful of turpentine, mixed with 1 teacupful of raw linseed oil or 1 wineglassful of cod-liver oil, and a little milk may be carefully given as a drench every third or fourth day. The lands on which the lambs have contracted the disease should also be dressed, in June or July, with 6 to 8 hundredweight crushed rock-salt to the acre, to destroy the ova and their hosts.



## LECTURE VII

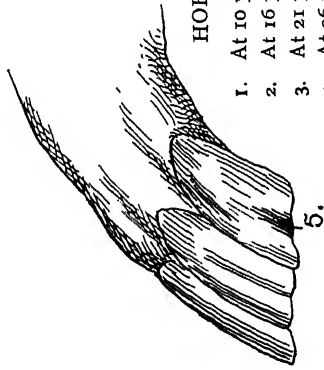
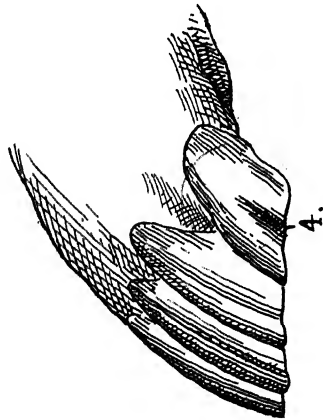
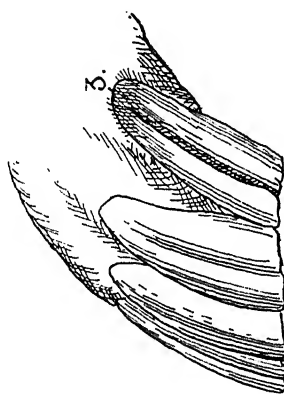
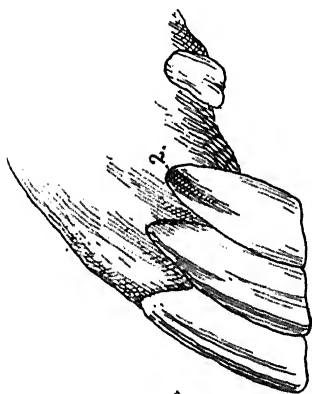
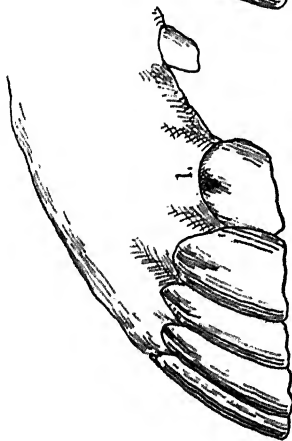
### THE DENTITION OF HORSES, CATTLE, SHEEP, PIGS, AND DOGS, AND DENTAL DISEASES

342. **Teeth** are the principal agents in mastication, and, although composed of the hardest structures in the body, are, in the first instance, developed by a very interesting process from one of the softest structures—the mucous or lining membrane of the mouth.

343. **The Tooth** is divided into the **crown**, **neck**, and **root**, and is made up of three structures—*ivory*, or *dentine*; *enamel*; and *cement*, or *crusta petrosa*. The **dentine** is whitish-yellow in colour, and forms the bulk of the tooth. It is found in the middle, in contact with the pulp, and consists of about 72 per cent. earthy matter and about 28 per cent. animal matter. The **enamel**—the hardest substance of the three—is of a pale bluish-white, and contains 95 per cent. earthy and 5 per cent. animal matter. It acts as a protection covering the external parts of the crown, and is interspaced in irregular curves between the *dentine* and *crusta petrosa*. The **crusta petrosa** is yellowish-white, and found on the outside of the tooth, in connexion with the root, or fang, and is softer than either the dentine or enamel; in fact, it is the bone of the tooth, and is composed of 67 per cent. earthy and 33 per cent. animal matter.

344. There are two sets of teeth—viz., **Temporary**, or **Milk Teeth**, which are much *smaller* and *whiter* than the second set, the **Permanent** (*see par. 348*).

# PLATE XXVII



HORSE'S TEETH AT DIFFERENT AGES  
Groove in Upper Corner—Incisor Tooth.

1. At 10 years,
2. At 16 years,
3. At 21 years,
4. At 26 years,
5. At 30 years.

## HORSE.

345. The horse, when full-mouthed, has forty teeth, as follows: Twelve incisors, six above and six below; four canine teeth, or tushes, one on each side of the upper and lower jaw (the mare has no canine teeth); twelve premolars, three on each side above and below; and a like number of molars similarly disposed.

346. The marks on the crowns of the **lower incisors** are an indication of the horse's age up to eight years. The indication marks in the lower jaw are nearly worn out in the central incisors at six years, in the lateral at seven years, and in the corner incisors at eight years old (*Plate XXVI. and text*). In an old horse, with well-formed teeth, artificial marks are sometimes burned in, to give the animal the appearance of being young. This process is called *Bishoping* (so named from the man Bishop, who introduced it), but it is readily detected, as the enamel round the depressions is destroyed in the operation. At the age of from nine to ten years the teeth change their shape, and begin to turn *triangular* and long. At ten years the upper corner incisor on the outer aspect presents at the top, close to the gum, a *dark yellow groove*, which, as the horse grows older, extends down the middle of the tooth until, at the age of twenty-one years, it reaches the bottom. When this mark is present—for it is not always so—it is a very good indication of the age; but see *Plate XXVII. and text*, which is after 'Galvayne.'

347. The **Number of Teeth** in our domestic animals is as follows:

Animal.	Incisors.	Canines.	Anterior Premolars.	Pre- molars.	Molars.	Total.
Horse	...	$\frac{1}{2}$	...	$\frac{1}{2}$	...	40
Ox	...	$\frac{2}{3}$	...	$\frac{1}{2}$	...	32
Sheep	...	$\frac{2}{3}$	...	$\frac{1}{2}$	...	32
Dog	...	$\frac{2}{3}$	...	$\frac{1}{2}$	...	42
Pig	...	$\frac{2}{3}$	...	$\frac{1}{2}$	...	44

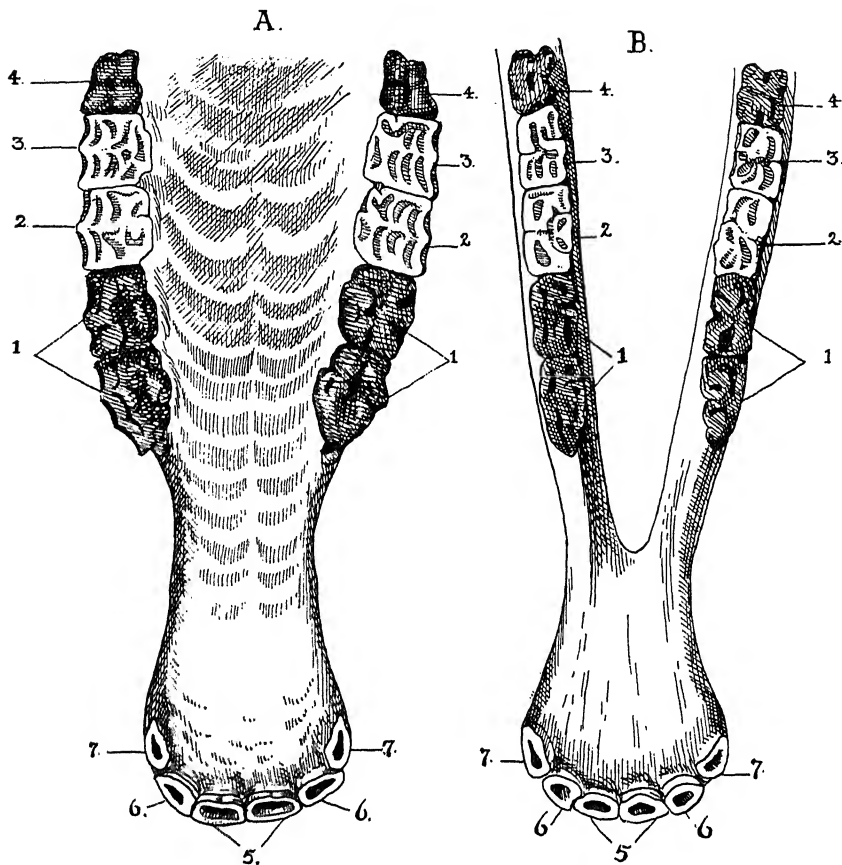
The top figures represent the upper jaw and the lower figures the under jaw.

348. If there is one thing more than another that should command the attention of the country practitioner, it is dentition. The condition of the teeth at times creates various disorders, disease,

and even death. By the casting or shedding of the crowns of the temporary, and their replacement by the permanent teeth, together with certain marks, the age of an animal for a time is indicated. Looking at *Plate XXVI.*, it will be noticed that at **birth** (1) the foal generally has two central incisors, and three premolars on each side, above and below ( $\frac{2}{2}$ ,  $\frac{6}{6}$ , sixteen in all), and all of them are temporary. At **six to eight weeks old** (2) it gets two lateral temporary incisors, above and below; and from **eight to ten months** (3) the corner incisors. From twelve months to two years of age small ponies are sometimes passed off as five-year-olds, more particularly coal-pit ponies, the marks on the crowns being similar. This deception can, however, be detected by looking at the front aspect of the teeth, when it will be seen that the temporary teeth are small and white, with a plain smooth surface, while the permanent teeth are much larger and broader, and of a creamy tinge, with a well-defined deep dark groove down the front of each tooth. At **one year** (4) the fourth tooth or first molar (*first permanent*) appears, and from **two to two and a half years** (5) the fifth tooth, or second molar, should be into wear; and it is to this period of the animal's life I shall give most attention. In many cases in cross-bred cart-horses, the fifth molar is not visible until the animal is from two and a half to three years old. From **two years and nine months till three years old** (6) the horse commences to cast the two central incisors, also the first and second premolars, above and below, and these are replaced by permanent teeth. By this it will be seen that in some cases—and it is a matter of great importance—the horse rising three years old not only casts twelve temporary, but gets sixteen permanent teeth—viz., four central incisors, two above and two below ( $\frac{2}{2}$ ); eight first and second premolars, two on each side, above and below ( $\frac{4}{4}$ ); also the fifth tooth or second molar, one on each side, above and below ( $\frac{2}{2}$ ) (*Plate XXVIII.*).

349. About this time in its dentition the animal is usually brought in from grass and put to work. What with the dental irritation going on and the new mode of living, is there any wonder that certain horses of peculiar nervous temperament suffer, and occasion-

# PLATE XXVIII



**A. UPPER JAW OF A HORSE RISING THREE YEARS OLD**

- 1, 1. First and Second Permanent Premolars.  
(Crowns of temporary teeth just cast.)
- 2, 2. Third Temporary Premolars.
- 3, 3. Fourth Teeth, or First Permanent Molars.
- 4, 4. Fifth Tooth on Each Side, or Second Permanent Molars coming into Wear.
- 5, 5. Permanent Central Incisors.
- 6, 6. Lateral Temporary Incisors.
- 7, 7. Corner Temporary Incisors.

**B. LOWER JAW OF A HORSE RISING THREE YEARS OLD**

Numbers have the same reference as in A.

ally to a great extent? If we take into consideration the disorder and fever set up in some children during teething, and the nervous exhaustion and complaints arising therefrom, need we be at all surprised to notice at this period the commencement of several nervous derangements in the horse?

350. Having had ample opportunities of inspecting animals, from foals upwards, I find it very rare that any sign or symptom of **chorea**, **shivering**, **string-halt**, or **clicking** (*par.* 598) occurs until the animal is rising three years old. From long observation I am, therefore, inclined to think that in the irritation set up during the extensive dental processes just referred to will be found the cause and the commencement of these nervo-muscular derangements, through a reflex nervous action that is set up, more particularly so when there is a hereditary tendency thereto. The most critical period, therefore, in the life of a horse is when it is rising three years old, for not only are there associated with it at this period the above-mentioned complaints, but also **strangles**; though whether the latter is partially due to extensive dentition, or to the change from outdoor to indoor life, or to the two combined, I am scarcely able to say; yet I am inclined to think that teething, in certain instances, has something to do with the cause. Again, at this period, if the true process of dentition is not going on, there may be abscesses formed at the root of the tooth, or in the sinuses, with disease of the *alveolar processes*—more particularly in the upper jaw—and ending in softening and degeneration of the bone, or bony tumours may form on the tooth itself. *Plate XXXI., No. 3*, represents a tumour on the crown of the fourth upper or first permanent molar tooth, due to extensive inflammation and degeneration of the bones of the face of a three-year-old filly.

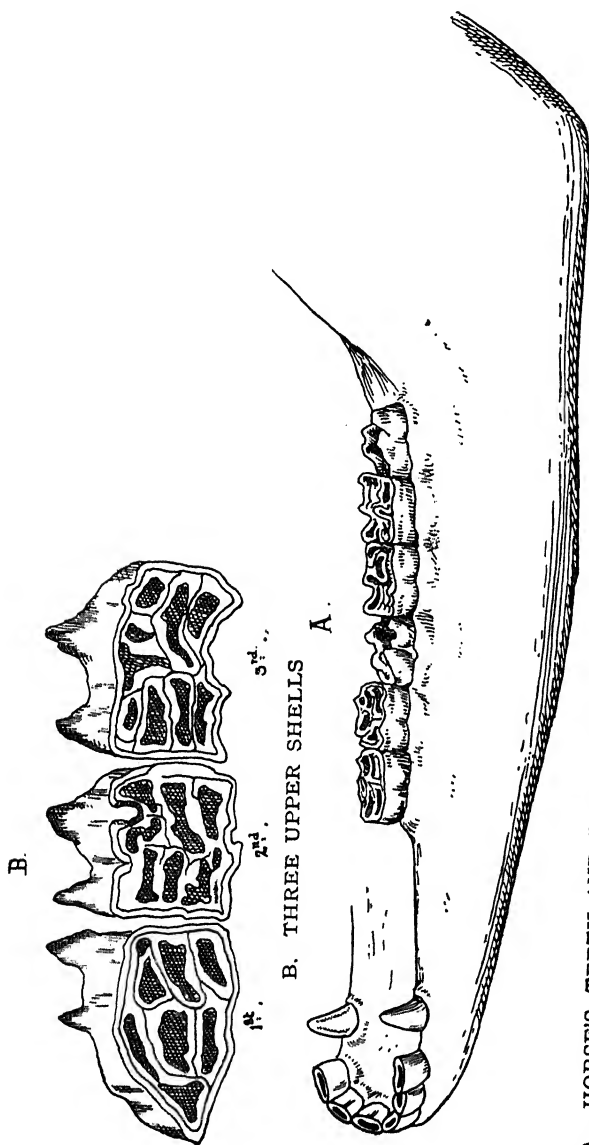
351. Shortly after I commenced practice a three-year-old cart colt was brought to me in a very emaciated condition for the purpose of having its **lampers** burnt or cut. On looking into the mouth, I saw the crowns of the first and second temporary pre-molars sticking on the top of the permanent teeth, which were well up above the gums. Here, then, was the cause of the poor condition

of the animal. I could not remove these shells with my fingers, and, having no instrument, I went to a blacksmith's shop, and had clips made on the sides of an old pair of tongs. With these I removed the eight shells, or crowns, and then prescribed tonic medicine. Up to this case I knew little about dental trouble, it being my first lesson. Since then I have devoted a good deal of time to it, and have had made to my order various instruments (*Plate XXXIII., Nos. 1 and 2*). I have, I may note, frequently seen the crown of the second premolar come off before that of the first. I have also in one operation removed the crowns of the first and second premolars joined together, and of such teeth I have several specimens (*Plate XXIX., C, 1st and 2nd*).

352. When a young animal is suffering from retarded dentition, it loses flesh, and the belly becomes tucked up; there is a long, shaggy coat, tight skin, ewe-neck, thin thighs, and flat ribs; it drags its legs, and walks with a listless gait, feeds badly, and eats little or no hay. There is also occasional and exhaustive diarrhoea. Examine the mouth, and if the crowns of the temporary teeth are the cause, remove them. Prevention is said to be better than cure, and people acting on this maxim now have young horses brought to my surgery, from December to June, to have their mouths examined, when, if necessary, I remove the crowns. This long and varying period is due to the time when the animals are born, as well as to their mode of feeding.

353. When from **three and a half to four years old** (7) the horse casts its lateral incisors and the third temporary premolar, and these are replaced by permanent ones, one on each side, above and below. The sixth tooth or third molar now comes into view; thus, at *four years old*, it casts eight temporary and gets twelve permanent teeth (*Plate XXX.*); but it seldom seems to suffer so much as at three years old, although there is an old saying that a four-year-old horse cannot stand work so well as a three-year-old. This, in my opinion, is due to the punishment it has gone through as a three-year-old, and the effects of which it has not been able to throw off. If you find an animal not doing well at this period, examine the mouth, and, if necessary, remove the shells from the

# PLATE XXIX



A. HORSE'S TEETH AND LOWER JAW  
 The third having cast the shell of the temporary tooth, and the sixth coming into wear.

C.

C. THREE UNDER SHELLS (Nos. 1 and 2 JOINED TOGETHER)



third molars. As a rule, the shells of the milk teeth come off from the lower jaw sooner than from the upper. In many cases when the shells are removed, also in cases of retarded dentition, a foetid smell, as of diseased bone, is noticed, and from the irritation set up in the lining membrane of the mouth, which extends to the throat, a troublesome cough may be induced.

354. At **five years old** (8) the corner milk incisors are replaced by permanent teeth, and the canines, or tusks, appear in the horse, but are generally absent in the mare; occasionally we find small rudimentary tusks in the latter. The horse is now full-mouthed.

355. With the exception of a young horse casting its teeth, and an old one with unevenly worn surfaces, I am not in favour of giving crushed or bruised oats to horses, as the crowns of the horse's molar teeth resemble the surface of the old-fashioned millstone, being properly adapted for grinding the grain. I therefore recommend oats to be given whole, so that the animal can have the pleasure of grinding them, thereby getting the full benefit of the salivary juices, and their action on the starchy matters of the food. Crushed oats are also more liable to be bolted, and cause stomachic derangement.

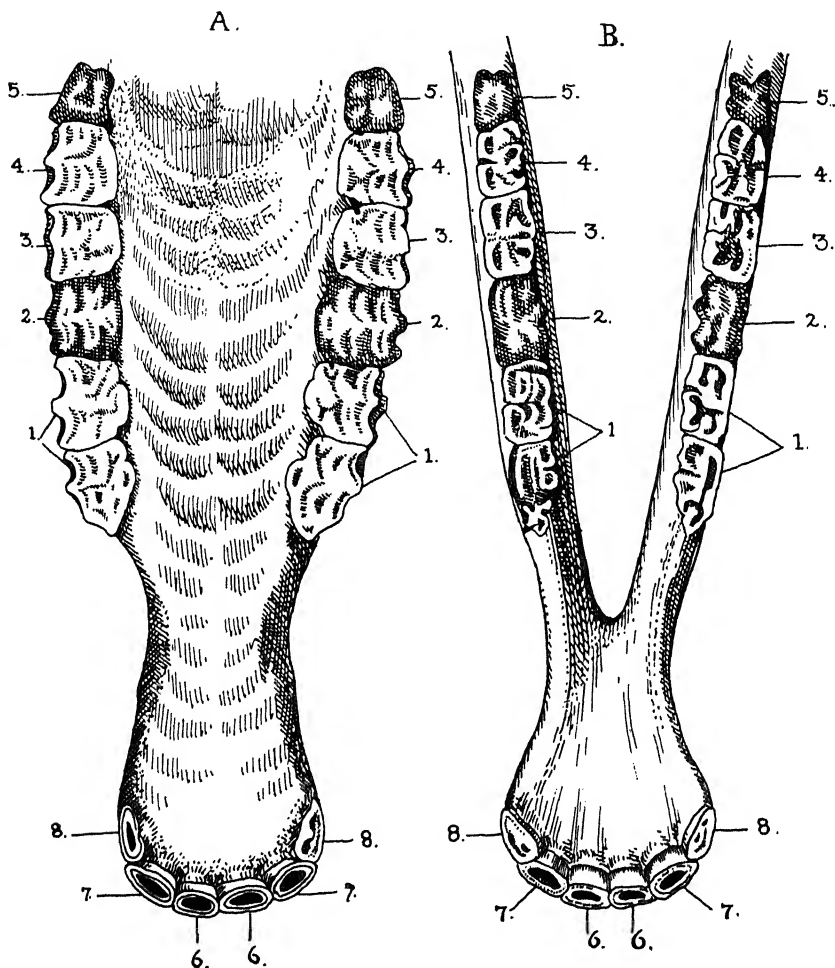
356. The upper molar teeth in horses and cattle are much larger and broader than the lower ones. The upper jaw, being a fixture, as it were, gives a broader and firmer surface for the rotary movement of the lower jaw to act upon; thereby, in some instances, in aged horses, the uneven wear leaves sharp ridges on the outer edge of the upper molars and inner edge of the lower: these have to be dressed down with the tooth-rasp (*Plate XXXIII., No. 4*), to prevent laceration of the tongue and inside of the cheeks. Occasionally the teeth become elongated and very uneven (particularly the last tooth on the lower jaw), and have to be cut by special shears, and in this case I usually operate with the animal standing, except when I have a rough customer to deal with. (For such an operation nothing beats Thompson's instruments, and I would point out that I am not the Thompson in question who introduced this useful article.) Molars are sometimes split, through getting some hard substance amongst the food, and for causing this there is nothing worse than foreign

grain. A bit of stone, a piece of iron, or a nail may have got into corn and caused the injury. By removing the loose portion of the tooth the animal generally does well, but, in time, the tooth opposite becomes elongated, owing to its not meeting sufficient wearing surface, and has to be cut off, or dressed down with a tooth-rasp.

357. It is said by some writers that teeth grow; to a certain extent this is true, but at **six years old** all the teeth are fully developed, after which period they gradually wear away. This is well exemplified by the incisors, or nippers, becoming triangular as they wear down, when their crowns take the shape of the fang or root. Teeth, however, become elongated when they are not made use of, owing to the tooth opposite becoming decayed or removed. As a proof that they wear, and do not grow, see *Plate XXXI., Nos. 1 and 2*, which shows the upper molar of a six-year-old horse and one of a horse twenty-six years of age. Damaged teeth are, however, most likely to become *carious*. I have come across a few of this nature, but, in young animals, as already stated, I think the disease more frequently commences in the *alveolar processes* (bone-plates) and sinuses, finally implicating the teeth themselves. Disease of the teeth of the horse is not very common, but when a diseased tooth is present the animal generally quids its food—*i.e.*, chews it, and then lets it drop out of the mouth in small pellets; in such cases the tooth has to be removed.

358. With the forceps I have had made (*Plate XXXIII., No. 3*), and which I find to be an improvement upon Professor Pritchard's, by the addition of the screw and longer leverage, I can, in a few minutes, remove any molar, either from the upper or the lower jaw. In extracting a tooth, I have the animal cast, but have a great objection to casting aged horses with 'hobbles.' I prefer side-lines in these latter cases. I do not use chloroform, unless specially requested to do so, as I think it is not necessary. After removing the tooth, I always dress the hole every third day by plugging with tow saturated with three parts water and one part tincture of iron, which answers splendidly, finally filling it with gutta-percha. In one case the diseased bone was so great, extending through into the nostril, that it took 4 ounces to fill the cavity. The horse in question did well

# PLATE XXX



## A. UPPER JAW OF A HORSE RISING FOUR YEARS OLD

- 1, 1. First and Second Permanent Premolars.
- 2, 2. Third Permanent Premolar (Crown of Temporary Teeth just cast).
- 3, 3. Fourth Tooth on Each Side, or First Permanent Molars.
- 4, 4. Fifth Tooth on Each Side, or Second Permanent Molars.
- 5, 5. Sixth Tooth on Each Side, or Third Permanent Molars, just into Wear.
- 6, 6. Permanent Central Incisors.
- 7, 7. Permanent Lateral Incisors.
- 8, 8. Temporary Corner Incisors.

## B. LOWER JAW OF A HORSE RISING FOUR YEARS OLD

Numbers have same reference as in A.

for years. The tooth opposite, in the lower jaw, had to be kept down by rasping every three or four months.

359. **Wolf Teeth** are found in the upper jaw immediately in front of the first premolars, and are generally thrown off when the horse casts the crowns of the two first premolars on rising three years old : but I have seen them in aged animals, and, in my opinion, they do no harm. I have never known them affect the sight of the horse, as is stated by some.

360. **Parrot-mouthed** animals are known by the upper jaw being much longer in front, overlapping the lower, when the teeth in the latter become elongated from not meeting the wear of the upper teeth, and in time injure the bars or gums of the upper jaw. These cases have to be closely watched, and the teeth dressed when necessary. **Sheep** seem to be most subject to this peculiar formation.

### CATTLE.

361. **The cow**, which I shall take as my illustrative type, has eight incisors, or, as is now taught, six incisors and two canine teeth, which are shovel-shaped, and with well-defined necks; but they are found in the lower jaw only, *and are always loose in their sockets*, the upper jaw being provided with a cartilaginous pad.

362. The shedding of teeth in cattle is very irregular, varying fully six months in their development, according to the breed and mode of feeding, but the following may be taken as a fair average : At *birth* (1) a calf may have from two to six incisors and two canine in the lower jaw, and twelve premolars (three on each side, above and below), all of which are temporary or milk teeth. About *six months after birth* (2) the fourth tooth, or the first permanent molar, makes its appearance; at from *fifteen to sixteen months* (3) the fifth tooth, or second permanent molar, is seen; and at *two years* (4) the sixth tooth, or third permanent molar, is through. About *this period* (5) the temporary, first and second inferior, and first superior premolars are thrown off, and six permanent teeth take their place. The first inferior premolar is very like a *wolf tooth* in the horse. The second inferior premolar is much larger (*Plate XXXII., C, 2*), and

is frequently cast before the first, but, as a rule, they are generally shed together at ages varying from one year and nine months to two years and three months. The second upper temporary premolar (6) is usually replaced by a permanent one, *between two years and three months and two years and nine months*. The third inferior temporary premolar is remarkable in having three distinct sections, or columns (Plate XXXII., C, 3), and resembles the sixth permanent; it is very much larger and longer than the second, and is cast (7) *between two years and three months and two years and nine months*. Shortly after this (8) the third superior premolar is shed. I have seen the third superior premolar come off before the second, and have also removed them both together (Plate XXXII., B, 2 and 3).

363. The following plate, representative of one side of the under jaw, shows the age when the **permanent molar teeth** are cut, and when the three first **temporary premolars** are cast and replaced by permanents :

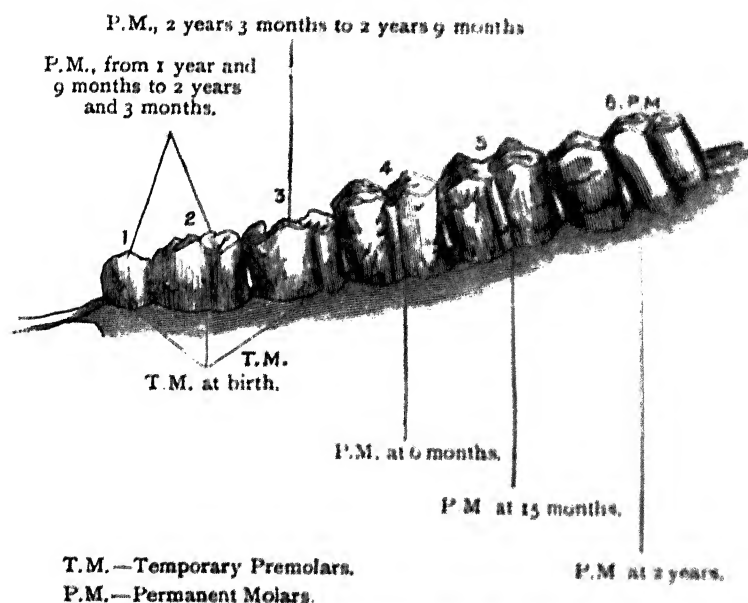
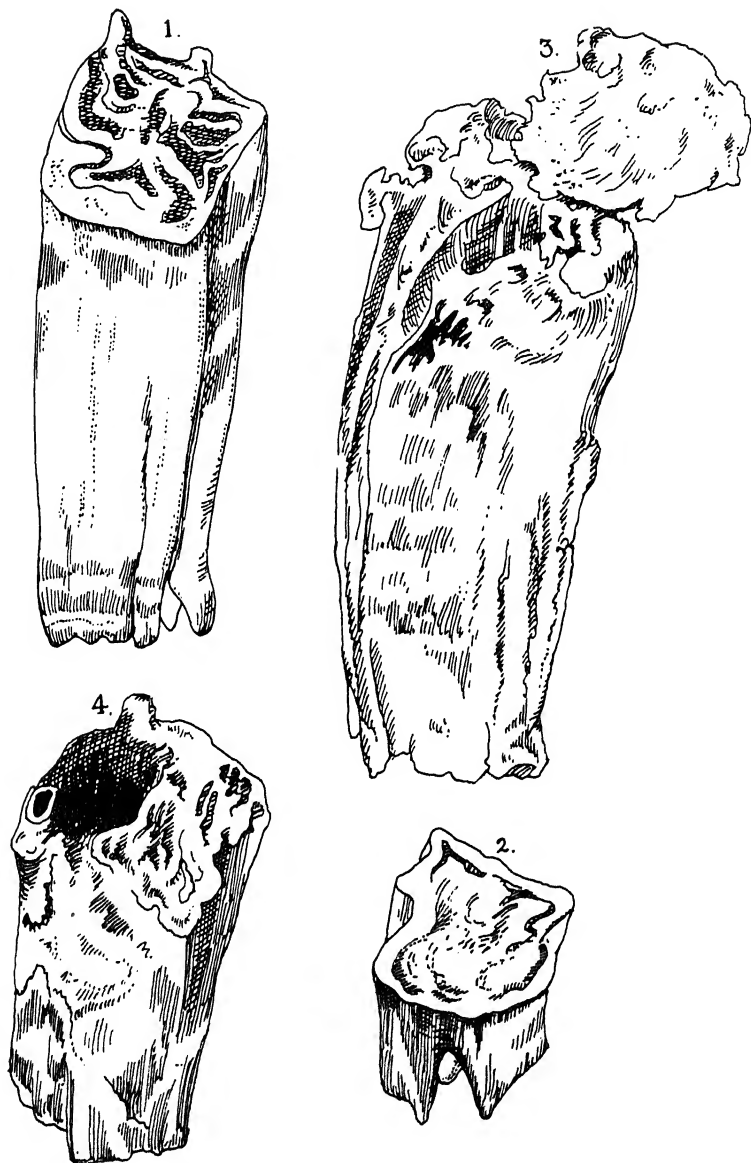


FIG. 12.—PERMANENT PREMOLARS AND MOLARS OF THE COW.

PLATE XXXI



1. Upper Molar from Six-Year-Old Horse
2. Upper Molar from Twenty-Six-Year-Old Horse } (*par. 357*).
3. Tumours on Crown of Fourth Upper Molar (*par. 350*).
4. Malformed Fourth Upper Molar.

364. **Incisors.**—*Between one year and nine months and two years and three months* the two central incisors are replaced by permanent teeth; *at two years and three months to two years and six months* the two middle lateral incisors are cast, and the animal has four broad teeth; *at three years old* six permanent teeth are seen; and *at about three years and three months* the corner or canine milk teeth are shed, and eight broad teeth are in view. The permanent teeth are very much larger and darker than the milk teeth, which are very white, and are thus readily distinguished.

365. The following illustration shows at what age the **incisor milk teeth** of cattle are cast and replaced by permanents :

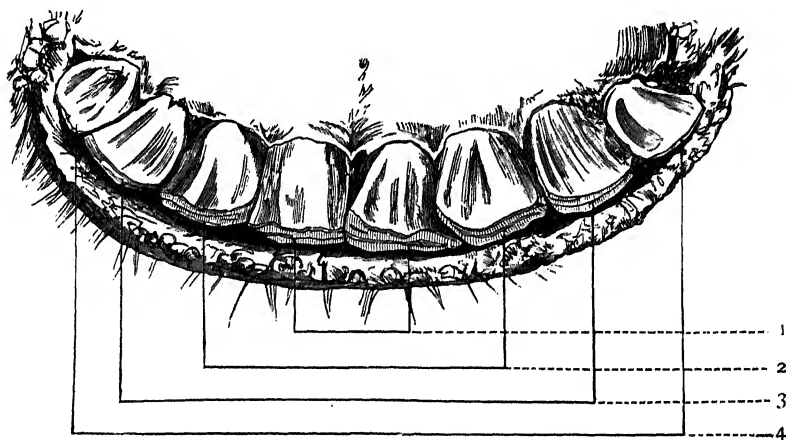


FIG. 13.—PERMANENT INCISORS OF THE COW.

1. Centrals, 1 year 9 months to 2 years 3 months.
2. Middle laterals, 2 years 3 months to 2 years 6 months.
3. Laterals, 2 years 6 months to 3 years.
4. Corners, or canines, 3 years to 3 years 3 months.

366. The crowns or wearing surfaces of the **molar teeth** of cattle are very unlike those of the horse, having sharp elevations and depressions, resembling the teeth of flesh-eating animals, and are well suited for tearing down rough fibrous grass, but are not adapted for grinding oats or other grain, the cow being a true herbivorous animal.

367. **Teething in cattle** on many occasions causes a great deal of constitutional disturbance, more particularly at from one year and nine months to two years and six months old, through the temporary premolars not being cast off, when teething fever, and in many cases fatal diarrhoea, is set up. Young animals, when suffering from the retention of the crowns or shells, have tucked-up bellies, flat ribs, tight hides, dirty skins, eyes gummy and congested, with a mucous discharge — have, in fact, all the appearance of piners. They feed very badly, and chew their cud in a very lazy and listless fashion, have exhaustive diarrhoea, and drink large quantities of water. I have frequently found the shells sticking fast between the cheek and the gums, in both upper and under jaws. Of course, any foreign substance, or anything wrong in the mouth, generally causes a large flow of saliva. In such cases the mouth should be examined, and the offending object removed if possible. I have also come across split molar teeth, with the fractured piece sticking in the tongue. Cattle rarely suffer from diseased teeth, but occasionally in aged animals the gums of alveolar processes become atrophied or wasted away, when the molar teeth can be readily removed with the fingers; such wasting away also arises from the diseases osteo-sarcoma and actinomycosis, etc. (*pars.* 78 and 234). In all cases where the emaciation is great I order good food, milk, linseed jelly, crushed oats, linseed cake, and bran, with a little salt, and give alkaline vegetable tonics, followed up with preparations of iron (*par.* 1073, No. IV.).

368. As a rule, I examine the teeth of a large number of stirks in spring and in autumn, and, where necessary, I remove the crowns with the forceps (*Plate XXXIII., No. 1*).

### SHEEP.

369. The dentition of the sheep resembles that of the cow as to the number of teeth and their position. There are six incisors and two canine on the lower jaw only; the upper jaw in front has, like the cow, a dense elastic pad. The molars are twenty-four in number —  $\frac{3}{2}$  premolars,  $\frac{3}{2}$  molars (*i.e.*, six on each side, above and below).

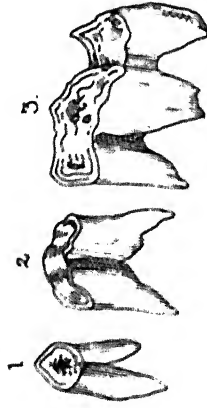


PLATE XXXII

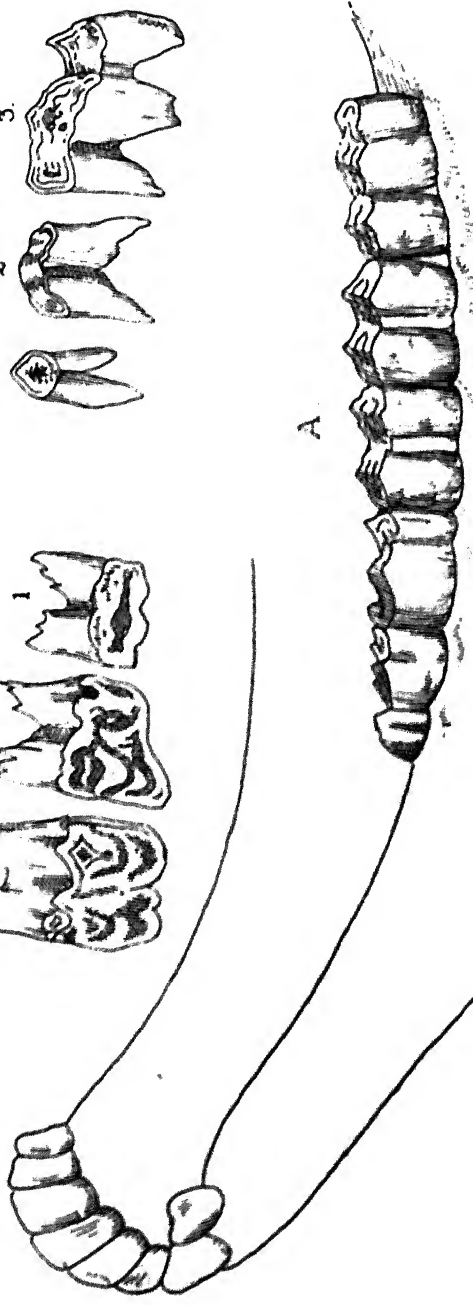
B.



C.



A.



A. Cow's Lower Jaw and Teeth.

B. First, Second, and Third Shells, Upper Jaw.  
C. First, Second, and Third Shells, Lower Jaw.

The teeth in shape are similar to those of the cow, but very much smaller.

370. **Incisors.**—From the birth of the lamb to the end of the fourth week the six temporary incisors and the two canine or corners are cut, also the first, second, and third temporary or premolars; and at twelve months the crowns of the incisors are well worn, the teeth being small and far apart. At about fifteen months the two central temporary incisors are shed and two permanent teeth take their place. At about twenty-two months the middle laterals (incisors) are replaced by two more permanent teeth, and the animal now has four broad teeth. At two years or two years and three months the permanent laterals make their appearance, and the sheep shows six broad teeth, and at three years old the corner or canine permanents are up.

371. **Molars.**—About the age of three months the first permanent molar, or fourth tooth, makes its appearance; at nine months the fifth tooth, or second permanent molar, is seen, and at eighteen months the sixth tooth, or last permanent molar, comes into view; and from twenty to twenty-two months old the first and second temporary premolars, above and below, on each side, are replaced by permanent teeth, and at about two years old the third temporary is shed, and a permanent tooth takes its place, the sheep now having twenty-four permanent molar teeth—viz.,  $\frac{2}{3}$  premolars,  $\frac{3}{3}$  molars on each side, and in some early mouths possibly six permanent incisors. The permanent teeth, both incisors and molars, are much larger and darker in colour than the temporary ones.

### FIG.

372. The dentition of the pig differs a good deal from that of the cow and sheep. Pigs have six incisor teeth above and below in front of the jaws; behind the corner teeth on each side in the upper and lower jaws are the canine teeth, or tusks; and between the latter and the first premolar teeth, one on each side, both above and below, are the anterior premolars; while there are six molars on each side, above and below—viz., three premolars and three molars.

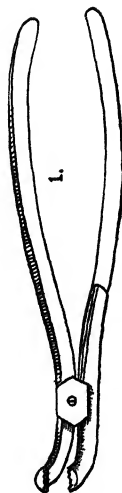
This makes a full total of forty-four teeth—*i.e.*, twelve incisors, four canines, four anterior premolars, twelve premolars, and twelve molars (*par.* 347). The incisors, canines, and three first premolars are temporary, or milk teeth, while the anterior premolars and true molars are permanent.

**373. Incisors and Tusks.**—Two sharp-pointed teeth are to be seen on both sides of each jaw at birth, with an open space in front, and these are the temporary corner incisors and tusks. About the fourth week the central temporary incisors make their appearance, being well in wear by the seventh or eighth week, and about the twelfth week the lateral temporary incisors are seen. Between the seventh and eighth month the corner incisors are replaced by permanent teeth, which are well in wear at nine months, while the permanent tusks are now making their appearance through the gum. When the pig is twelve months old the central temporary incisors are replaced by permanent ones; and when about eighteen months old the lateral permanent incisors take the place of the temporary teeth, and the central incisors show signs of wear at their edges.

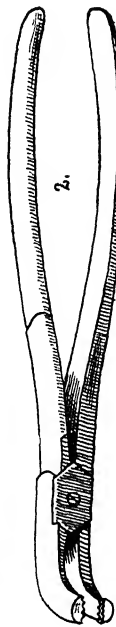
**374. Molars and Premolars.**—Between birth and up to four weeks old three temporary pre-molars on each side of each jaw, above and below, are seen, the second and third coming through before the first. The fourth tooth, or first permanent molar and the anterior premolars make their appearance between the fifth and sixth month, and are well up at the ninth month. From ten to twelve months the fifth tooth or second permanent molar is seen, and about three months after (fifteen months old) the three first temporary premolars are shed, and permanent teeth take their place; while between the seventeenth and eighteenth month the sixth tooth and last permanent molar is forward. And after this the teeth wear and become dark in colour. Dental derangements in pigs are, however, of rare occurrence, and veterinary aid is seldom or never required.

**375.** For further information on the subject of the dentition of the horse, cow, sheep, and pig, the reader is referred to Professor

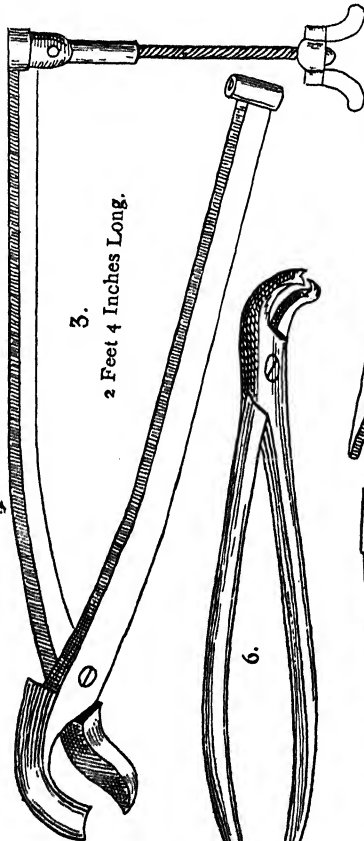
# PLATE XXXIII



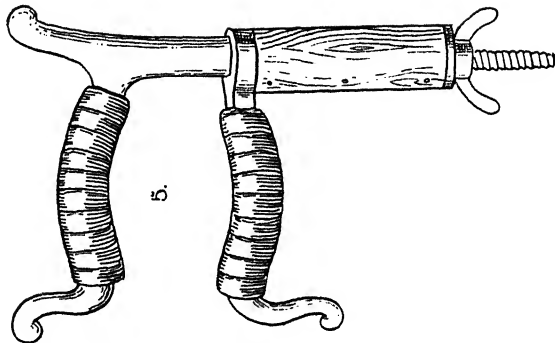
12 Inches Long



15 Inches Long.



2 Feet 4 Inches Long.



1. Tooth-Forceps for removing Crowns (Shells)—Cattle,
2. Tooth-Forceps for removing Crowns (Shells)—Horse.
3. Large Forceps with Screw for extracting Molars—Horse.
4. Portable Tooth-Rasp.
5. Balling-Iron.
6. Tooth-Forceps, Crowns, Cattle and Horse Incisors, and Wolf Teeth.

Sir Geo. Brown's pamphlet, 'Dentition and Age of the Animals of the Farm.' I may add that I have found this little work very accurate.

### DOG.

376. The dog, like other domestic animals, has both a temporary and a permanent set of teeth, divided into incisors, canines, anterior premolars, premolars, and molars. The milk teeth are twelve temporary incisors (six above and six below, in front of the jaw), four temporary canine teeth or tusks (two above and two below, one on each side, the upper, as a rule, being the strongest), and twelve temporary premolars, the three first on each side of the upper and lower jaws. On the completion of the dentition there are forty-two permanent teeth in all (*par.* 347)—viz., twelve incisors ( $\frac{6}{8}$ ), four canines or tusks ( $\frac{2}{8}$ ), four anterior premolars ( $\frac{2}{8}$ ), twelve premolars ( $\frac{6}{8}$ ), and ten molars ( $\frac{4}{8}$ ). The premolars, sometimes called false molars, are slightly separated from each other, and are cone-shaped and pointed in the middle. The last temporary premolar, or the fourth tooth from the tusk on the upper jaw, is the largest and strongest, and is closely connected behind with the two true molars, which have flat crushing crowns. The fifth tooth from the tusk, or first permanent molar on the lower jaw, is the largest tooth in the mouth, and a composite tooth. Anteriorly it is cone-shaped and pointed, like the premolars, while the posterior part is flat and crown-shaped, like a true molar. The two last teeth are true molars, and have flat crushing crowns. In some cases there are seven on each side of the upper jaw as well.

377. A puppy has no teeth at birth, but their outline is seen on the gums. The larger breeds of dogs generally cut their teeth sooner than the smaller types, but the time within which the teeth are cut and shed varies very much according to the breed. The first tooth to make its appearance is usually the second premolar in the lower jaw, and this occurs on or about the twentieth day after birth. The other teeth—incisors, tusks, and premolars—follow in quick succession, so that about the fifth week after birth all the milk teeth are in view. As a rule, the lower temporary or milk teeth are cut before the upper, but the reverse is the case with the permanent

teeth. When the puppy is three and a half months old, the temporary or milk teeth fall out, and are replaced by permanent teeth, which process takes from four to six weeks; so that when the dog is four and a half to five months old the dental process should be completed — *i.e.*, in the large breeds, but the small types, such as toy dogs, etc., take several weeks longer. According to recent teaching, the three first molars or temporary teeth, and those that replace them (on each side, above and below), in the horse, cow, and sheep, are called premolars, while the pig and dog have each four more (one on each side, above and below), called anterior premolars, and situated close behind the tusks.

378. **Dental Derangement.**—As a rule, puppies rarely show any inconvenience when getting their milk teeth, but in casting the temporary and getting the permanent teeth they sometimes suffer from diarrhoea, fits, etc. Occasionally the roots of the temporary teeth are pressed to one side by the permanents, when they become attached to the bony processes of the jaw, and cause inconvenience and trouble; in such cases they must be removed. The tusks seem more liable to this than the other teeth. The teeth of the dog are, at times, broken by the animal chewing hard substances, such as stones, etc.; and in such cases the sharp edges must either be filed or cut off. Tartar also occasionally accumulates round the tooth, just above the gum, and when this gets to be troublesome it must be scraped off. Any diseased teeth that may be observed, when interfering with the feeding of the dog, should be removed.

### FEEDING STUFFS.

(IN CONNEXION WITH DENTITION.)

379. A few brief remarks anent some of the various kinds of feeding stuffs may not be out of place in this lecture.

380. **Wheat.**—This cereal, although a ready feeder, contains too much starchy matter to make it a safe article of diet, either for horses or cattle, when given alone or in any appreciable quantity. *For the horse*, it should never be given raw, as it has a tendency to produce flatulent colic, congestive fever, weed, swelled legs, laminitis, and diarrhoea. It also throws the animal out of condition, causing

it to puff, blow, and sweat on the least exertion. When given at all, it must be well boiled, used very sparingly, and mixed with other foods. *For cattle* it should not be boiled, but given in a rough-ground or crushed state, and when used judiciously, and given in combination, for instance, with decorticated cotton cake, it is a splendid feeding substance.

**381. Barley.**—If there is one thing more than another which I have a great fancy for, it is well-boiled, sound, sweet barley, for feeding to horses or cattle when recovering from any illness. If the animal can be induced to take it, there is nothing better, when it is mixed with a little bran. The boiling of barley seems to change its properties, converting the starchy matter as it were into *dextrine*, thus aiding the first part of the process of digestion. For a very useful and agreeable change in *feeding for a horse* there is nothing to equal a mash of fresh, well-boiled barley, given twice a week, mixed with a little bran and salt. It is readily digested, and is very refreshing to a tired horse after heavy work on a stormy day. Barley should, however, never be given raw to a horse, as it produces intestinal disorders of various kinds. *For cattle* it is best boiled, but may be given raw when crushed and mixed with other foods. *For a calf*, where milk is scarce, barley-flour (meal) combined with the same quantity of good oatmeal, well boiled, and mixed with skim milk, makes the best food, and will be found far superior to any of the fancy patent calf-meals. It keeps the stomach and bowels in proper order, and the young animal thrives and does well on the mixture.

**382. Oats** may be looked upon as the staple food for both horses and cattle, *but upon no consideration should they be boiled for either*. It is a waste of time, money, and fuel to boil oats, as it makes no change in them; the horse is inclined to bolt them in this state without chewing, and they pass through a cow unchanged. *For the horse*, as already stated under teeth (*par. 355*), oats should be given whole in the berry, except in the case of a young animal which is teething, or an old one with uneven teeth, when they may be bruised. *For cattle*, they should always be mashed or crushed, and mixed with other foods. Farmers, as a rule, have a very great fault in giving too many oats to cattle. The cereal, being the produce of their own

land, is apt to be used too freely, some giving as much as 8 pounds to 10 pounds per day when only about half this quantity will be assimilated or taken into the system, the other half passing through the bowels as waste material. Better results may, therefore, be obtained by selling half the oat-crop, and, with the money, purchasing linseed and cotton cakes. Mixing these with the remaining oats (crushed) will give a quicker and more profitable return and a richer manure heap.

383. **Maize** (Indian corn).—This is a good all-round article, and will give better results on expenditure than any other known feeder. *For the horse*, when doing quick work, it is, however, of little or no use, either boiled or raw, nor should it be given to a horse which has a tendency to lay on fat, or to one having little work to do, as it throws the animal out of condition, conduces to swelled legs, grease, and cracked heels, and makes the animal lazy and sluggish; but for a cart-horse, or waggon-horse, having regular working-days, it answers fairly well, when broken and mixed with oats, beans, pease, and bran. *For cattle or sheep* it answers splendidly when made into meal, or broken and mixed with cotton and linseed cakes. *For the pig*, it should not be given to a very young animal, as it is apt to produce irritation of the stomach, accompanied with fits. Pollards are much better, or barley and oatmeal mixed, and well boiled. For a half-grown or full-grown pig, Indian meal should be well boiled—scalding, as is practised by many, is not sufficient. There are several preparations now made from maize and used for the feeding of stock, such as maize germ cake and meal, cooked and rolled maize, known as Uveco, Ceros, cooked food, etc., all of which mix well with other concentrated foods.

384. **Beans**.—These are much favoured by many feeders, being given boiled, whole, or broken, and as meal, both to horses and cattle. *For the horse*, I have no fancy for beans as a food, owing to their tough, indigestible skin, and, from long observation, I find that, in many cases, they produce intestinal disturbance, with diarrhoea. Before using, they should, however, be well washed, particularly foreign beans, as they are usually very much mixed and covered with dirt. Beans, it will be found, generally enter into the composition of the mixed horse foods prepared by corn merchants. *For cattle*,



bean-meal has many admirers as a butter and cheese producer, and also for fattening purposes; but I do not fancy it, as I think better results can be obtained from other foods of a more digestible nature.

385. **Pease.** Sound Canadian pease are more to my liking as a horse and cattle food. They are not so indigestible as beans, and a good handful given whole among the corn and bran three times a day will be found to have a good effect on hunters, hacks, carriage and cart horses. When my horses are in full work, I can get more staying-power from this food than from any other. Care must, however, be taken in purchasing pease, as of late years it has been noticed that many samples have been mixed with the Indian pea (*Lathyrus sativus*), commonly known as the *dog-tooth pea*, of which there are various kinds. This latter pea, when given for any length of time, may occasion paralysis, roaring, difficulty in breathing, and sudden death. Some time ago a large number of horses, in various towns in England and Scotland, died from the effects of these Indian pease, or 'gram.'

386. **Linseed** is now grown in nearly all parts of the globe, and heavy consignments are yearly brought to this country from India, Russia, America, and other distant parts. The seed thus imported generally contains a large amount of foreign substances, such as weed seeds, dirt, etc. In some instances foreign substances have been found to a very considerable extent, analysis showing as much as 2.45 per cent. of sandy matter and 23.40 per cent. of foreign seeds. Therefore, in using linseed in any form, these obnoxious bodies should be screened out. Linseed may be used after having been boiled, or steeped in hot water, or crushed into meal. A horse recovering from chest or bowel complaints is very much benefited by a little being added to boiled barley and bran. For a cow, it may be given boiled, or crushed and mixed with the other food. For a calf, it is generally boiled, or steeped, and mixed with milk or ground into meal.

387. **Linseed Cake.**—This cake is made from a variety of seeds grown in different countries. Russian seed makes the best cake, and Bombay the next—that is, if regard is had to the amount of oil they contain respectively. There are, of course, a good many

inferior makes of linseed cake, as of other cakes, as can be gathered from the physical appearances of the various brands on the market. There is also a great difference of quality in what are called *pure* linseed cakes. Undoubtedly the best, and those most entitled to be classed as *pure*, are those manufactured from *genuine* seed that, previous to crushing, has been passed through a closely-meshed screen, which takes out all the impurities, such as small weedy seeds, dirt, etc., called screenings. Some manufacturers, however, do not put themselves to the trouble of taking these out, but simply crush up the seed as they receive it. It sometimes happens that a cake-maker comes across a fairly clean parcel of seed, and gets a name for making a good cake, through the good fortune of having had this lot tested, but the next lot of seed may be faulty, and yet this cake will be called genuine linseed cake, being made from the seed as imported, and without any admixture. It must, therefore, be understood that there is a considerable difference in the relative merits and value between the cakes made from screened and un-screened seeds. Linseed cakes are now made by the best seed crushers guaranteeing 95 to 98 per cent. of purity.

388. A good screened sample of linseed, and linseed cake made therefrom, should show an analysis something like the following :

	Linseed.	LINSEED CAKE.				
		A.	B.	C.	D.	E.
Moisture .. ..	7·80	11·46	13·33	9·80	11·04	14·68
Oil ... ..	36·94	12·63	10·96	14·34	11·63	10·96
*Albuminous compounds	25·31	30·00	31·87	29·50	30·12	30·13
Mucilage and other carbonaceous principles	20·27	32·29	30·85	30·58	32·82	30·75
Phosphate of lime ...	3·63	4·90	4·66	4·90	4·89	4·26
Fibre ... ..	6·05	8·12	7·13	8·02	7·74	7·72
Insoluble matter ...	traces	·60	1·20	2·86	1·76	1·50
		100·00	100·00	100·00	100·00	100·00
*Containing nitrogen ...	4·05	4·80	5·10	4·72	4·82	4·76

A and B.—Analyses of cakes guaranteed 95 per cent. of purity.

C.—Analysis of **Bombay** linseed cake shows a high percentage of oil, but a little too much insoluble matter. The seed cannot have been well screened.

D.—A sample of **Hamburg** linseed cake.

E.—A new-made **English** cake, guaranteed, which shows too much moisture.

389. Cake showing an analysis of from 8 to 10 per cent. of oil is more frequently met with than the above qualities, and is by no means bad, but I should advise buyers never to go below this figure, if a cake is wanted that will give satisfaction. It must be borne in mind that the seed is crushed and pressed more for the oil it will produce than for the cake alone. Linseed oil is worth about £31 per ton, while the cake is valued at from £9 to £11 per ton. It is, therefore, to the interest of the manufacturer to get the best and most improved machinery that will extract the greatest percentage of oil, and when this is done the cakes are generally hard and of a light colour. The broad, thin, flat cakes are of this class, and are largely manufactured in America, as well as in England. These often show only from 6 to 7 per cent. of oil, and are useful for feeding growing cattle, and, at times, profitable enough to buy; but for quick feeding of stock the old-fashioned oblong shapes, which are made from screened seeds, are the best, when guaranteed 95 to 98 per cent. of purity. They are much thicker, and richer in oil—oil may be looked upon as ready-made fat—are darker in colour, and of a softer texture than the other cakes.

390. Good linseed cake is one of the safest foods we have, and is of great value for feeding cattle and young stock, especially in winter. It is also a useful feed for milch cows, though it is more a fat-producing than a milk-producing food. Another recommendation in favour of linseed cake is that cattle fed upon it invariably enjoy good health, and are not liable to contract skin or other diseases. *For a horse* thriving badly, with an unhealthy, ragged, dingy-looking coat, a handful each of crushed, pure linseed cake and whole Canadian peas, given night and morning, mixed with corn and bran, has a splendid effect. *For the cow*, linseed cake may be given at the rate of from 3 to 9 pounds per day with the best possible results; whilst a young calf, six to eight weeks old, may receive it in quantities of from 3 to 4 ounces with a little crushed oats and bran daily, the quantity being gradually increased as the calf grows older.

391. **Decorticated Cotton Cake** is cake made from seed having the husk removed, and is chiefly made in America, as the

husk of the cotton seed can best be removed when the seed is green. The cake is then manufactured from the seed or kernel. For analysis of a good sample of decorticated cotton cake, see *par.* 393.

392. Like linseed, cotton seeds are crushed for the oil they contain, and of late greatly improved machinery for this purpose has been devised. Decorticated cotton cakes are generally very hard, so much so that farmers are almost afraid to use them. This causes some dealers to have their decorticated cake made into meal, an expedient which increases the risks to feeders, for the meal when kept too long in closely-packed bags becomes heated and perhaps mouldy, when it is dangerous to stock (*par.* 324). Great care is, therefore, necessary for the buyer not to purchase too much of the ground article at once. Decorticated cotton cake is also very dangerous when it has been damaged at sea, for the same reasons as those urged against the mouldy meal. Numerous cases are on record where numbers of cattle have died from the effects of eating moulded decorticated cotton cake. This cake should always be used in combination with some farinaceous matter, such as Indian meal, crushed oats, barley or wheat, bran, etc. As a milk, butter, and flesh producer it stands unrivalled, owing to the heavy percentage of flesh-forming (nitrogenous) materials it contains. It should never, for this reason, be given to stock under one year old, except with the greatest caution and judgment, and should not on any account be used for cows on the point of calving, nor for a month after, as the milk with such feeding is too rich, and brings on diarrhoea—white scour (*par.* 333)—when given to young calves. The manurial residue of decorticated cotton cake is also valuable, and is estimated at £2 16s. 5d. per ton of food consumed; in fact, it stands without a rival for the renovation and improvement of old laid grazing pastures. In the course of a couple of years or so, given in anything like liberal quantities, it has a marked effect, both on the quantity and quality of the herbage. Of late a new feeder in the shape of **Soya Bean** cake and meal has been tried for stock feeding, it is very rich in albuminoids, but low in oils, being 44 per cent. and 6 per cent. respectively. At first it was thought the cake would be equal to the best decorticated cotton cake, but the results have not been as good as was anticipated.

393. **Uncorticated Cotton Cake.**—In the manufacture of this cake the husk and the kernel are ground together, and it is extensively made in England. The best qualities are manufactured from Egyptian seed, and command the highest prices, although the Bombay seed gives equally as good results and is sold at less money. Even the best class of these, however, show but a poor analysis compared with decorticated cake, as the following analyses indicate:

	UNCORTICATED COTTON CAKE.		DECORTICATED COTTON CAKE.	
Moisture	11.24	12.16	7.10	8.10
Oil	6.54	6.74	14.08	13.50
*Albuminous compounds	21.02	22.12	44.37	41.26
Starch, sugar, and carbonaceous compounds	55.97	54.05	27.81	30.80
Phosphates	4.63	4.93	6.64	6.34
Insoluble matters	traces	traces	traces	traces
	100.00	100.00	100.00	100.00
*Containing nitrogen	3.46	3.54	7.10	6.64

394. Uncorticated cotton cake is largely used in some districts. In early spring, when the grasses are young, it has a good effect, owing to the tannic acid it contains preventing looseness of the bowels in cattle, but it should always be used fresh. Therefore large stocks, however cheap, ought never to be stored over July, August, and September, for during these months myriads of insects are passing through their various stages of life, and seeking winter shelter for the reproduction of their species for another year, and they will infest the cake and injure it. When cakes become mouldy they are very dangerous to stock, often producing blood diseases and death. Serious fatality frequently arises from the use of cake of this description, often leading to lengthy and unpleasant litigation, the case generally going against the manufacturer or seller when actually the feeder is to blame for having too big a stock at the wrong time of the year and allowing it to mould. Mouldy cakes of any class should never be given to stock.

395. **Palm-nut Cake and Meal** are prepared from palm fruit, which is ground, heated, and pressed in a somewhat similar manner

to linseed and cotton cakes. Cattle do not take very much of either of these articles, but when once they acquire the habit they thrive and do well. As milk and butter producers, palm-oil and meal are great favourites with many dairymen and are when used in combination with other feeding materials.

396. **Rice Meal.**—There is always a considerable quantity of this food on the markets. It forms a fairly good cattle food, extensively used in many districts, but great caution is necessary in purchase, as it can be bought at almost any price, and is frequently adulterated and damaged. It is more used in making fannin meals and cakes than as a feeder by itself.

397. **Cocoa-nut Cake and Meal** are made from the dried seed or flesh of the cocoa-nut, which is reduced to a rough meal by machinery, and treated in much the same way as seeds in the manufacture of other cakes, the great object being to extract the oil, which is very valuable, and, unlike the others, is solid, not melting lard at ordinary temperature. The residue is a light-colored cake, having a delicious smell and nutty flavour, and is much relished by all kinds of stock. It is especially valuable for fattening cattle and breeding ewes in frosty weather.

398. The analyses of cocoa-nut cakes show :

	F.	G.
Moisture ... ..	9.60	8.40
Oil ... ..	9.68	11.36
*Albuminous compounds ... ..	20.62	20.37
Carbonaceous principles ... ..	37.23	40.61
Phosphates, etc. ... ..	5.43	5.00
Fibre ... ..	15.34	12.97
Insoluble matter ... ..	2.10	1.29
	100.00	100.00
*Containing nitrogen ... ..	3.30	3.26

F.—Analysis of a sample of Egyptian cocoa-nut cake, but not so fine as English-made cakes.

G.—Analysis of cocoa-nut cake.

H.—Analysis of palm-nut cake.

G. and H. both English-made cakes.

399. **Compound Cakes and Meals.**—While believing in a mixed food, I do not advocate the purchase of prepared fancy-named mixtures. The articles used in their composition may be of an inferior, *mouldy*, or doubtful character. There is nothing equal to the simple cakes, crushed and mixed with maize, meal, or home-grown ground corn, and, if necessary, flavoured with powdered locust bean or fenugreek. If mixed foods are wanted, the best way is to buy the materials and mix them to your own satisfaction. It is important, however, to be careful not to overbalance the materials. One part of albuminous or nitrogenous matter to four or five fat-forming matter is the most suitable mixture for feeding cattle. I have seen evil effects follow the consumption of badly-balanced foods. In buying fancy compound mixtures care is necessary, for in large seaports such as London, Hull, Liverpool, Leith, etc., there is always a great amount of damaged grain, corn, cakes, etc. These are sold by auction, and have to be placed somewhere. There are first, second, and third-class damaged: the first and second might be dressed and sold as a good, sound article; the third-class is assorted, ground, and made up into compound mixtures, flavoured with aromatics, and sold on the market as first-class feeding cakes and meals. I have every reason to believe that these sorts of feeding stuffs are largely responsible for many of the outbreaks of disease amongst cattle and pigs. As to whether the bacillus of anthrax is preserved in cotton-seed cakes, even after they have been subjected to heat and high pressure, I would not offer any definite opinion, but it is within my knowledge that in wool shoddy which had been subjected to great friction and heat in the polishing of tin plates no fewer than sixty distinct species of foreign plants were found growing on the refuse heap where it was collected. If such a variety of vegetable life could be found in wool shoddy after the friction to which it had been subjected, I do not see why the bacillus of anthrax, if it were in the woolly film attached to the cotton seed at all, might not survive the crushing (*par.* 327). The meal of the *Indian pea*, already referred to, as well as that of *castor oil beans*, has been found mixed in these compound cakes and meals, which, when used, have had fatal effects on both cows and sheep. I am afraid that, in many

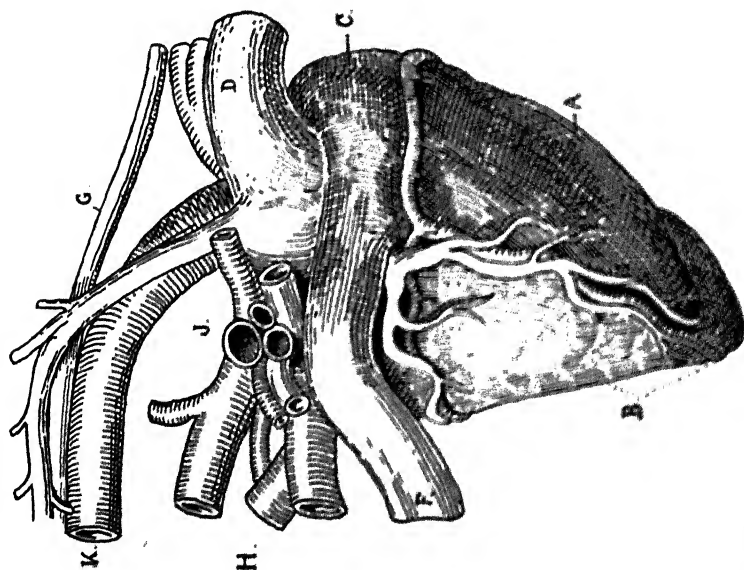
of these instances, the deaths have been attributed to anthrax, and so caused great inconvenience through restrictions being put on preventing the removal of stock.

400. **Bran.**—The feeding properties of the husk of wheat, although extensively used, are looked upon as very limited. It is a well-known fact that if a horse in regular work receives two or three mashes of bran in succession it will be severely purged. This is due to the exciting effects set up in the lining membrane of the bowels by the indigestible nature of the bran; and yet a good warm bran mash is considered the best food for a tired and starved animal. While a great many cattle feeders consider the money wasted that may be laid out on bran, I am satisfied, from long observation and practical trial, that it has a very important and highly beneficial effect in the assimilation of food. Bran, or husk of wheat, as already stated, from its indigestible nature, has a stimulating action on the glands and absorbents studded all along the intestinal tract, exciting them into greater action, and, by these means, more nutritive material is taken up and assimilated from the food given with it than would otherwise be done if the bran were withheld. Again, if bran be damped with warm water up to 75° or 80° F., and covered over for three or four hours, a bacterial fermentation is established which greatly increases its feeding properties.

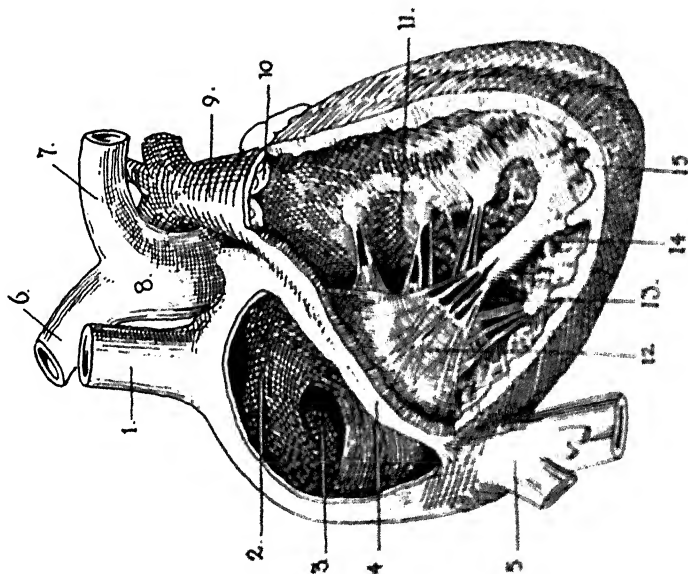


PLATE XXXIV

A.



B.



## EXPLANATION OF PLATE XXXIV

### A. RIGHT SIDE OF THE HEART

- A. Right Ventricle.
- B. Left Ventricle.
- C. Right Auricle.
- D. Anterior Vena Cava.
- E. Posterior Vena Cava.
- G. Thoracic Duct.
- H. Pulmonary Arteries.
- I. Coronary Artery *Nutrient Vessel of the Heart.*
- J. Pulmonary Veins.
- K. Aorta.

### B. RIGHT SIDE OF THE HEART LAID OPEN

- 1. Anterior Vena Cava.
- 2. Musculi Pectinati.
- 3. Interior of Right Auricle.
- 4. Division between Auricle and Ventricle.
- 5. Posterior Vena Cava.
- 6. Anterior Aorta.
- 7. Posterior Aorta.
- 8. Trunk of Aorta, as it arises from the Left Ventricle.
- 9. Pulmonary Artery, as it arises from the Right Ventricle.
- 10. Semi-Lunar Valves.
- 11. Interior of Right Ventricle.
- 12. Tricuspid Valves.
- 13. Chorda Tendinea.
- 14. Papillary Muscle.
- 15. Walls of Right Ventricle.

LECTURE VIII  
CIRCULATORY AND LYMPHATIC SYSTEMS, AND  
THEIR DISORDERS AND DISEASES

PART I

THE CIRCULATORY SYSTEM.

401. THE organs of circulation, in all animals, comprise—

1. The **Heart**, which, so to speak, pumps blood through the body for purification and circulation.
2. The **Arteries**, which carry blood to various portions of the body.
3. The **Capillaries**, which form the connecting medium between arteries and veins.
4. The **Veins**, which return the blood to the heart.

402. The **Heart** is a reddish-brown, hollow, cone-shaped muscular organ, situated between the right and left lungs, in the middle of the chest, or thorax (in other words, in the *mediastinum*), having a base which looks upwards, a body, and an apex pointing downwards in a slightly oblique manner towards the sternum, or breast-bone, inclining slightly to the left side. It is composed of involuntary muscular fibres, and is enclosed in a fine fibro-serous sac, or bag, called the *pericardium*, the surface of the heart being covered by a serous membrane—the *epicardium*. In the horse and cow it is about 8 inches in length from the base to the apex, and weighs from 6 to 7 pounds. The walls on the right side of the heart are much finer and thinner than those on the left, whilst the walls of the left ventricle are about three times as thick

as those of the right. The heart receives its nutrient blood from the *coronary arteries*, the blood being returned by the *coronary veins* into the right auricle.

403. Internally, the heart is divided into four cavities—*two auricles* and *two ventricles*; the auricles and ventricles being separated from each other by a partition—the *auriculo-ventricular septum*—whilst the cavities are lined by a delicate membrane, called the *endocardium*.

404. **The Auricles** are the upper cavities of the heart, and form its base, and open into the ventricles by orifices guarded by valves—the valve on the right side being in three segments, and named the *tricuspid* (*Plate XXXIV., B, 12*); while that on the left is in two, and is called the *bicuspid*, or *mitral*. On the inside of the auricle, chiefly in the appendix of each, are noticed fleshy elevations, called *musculi pectinati* (*Plate XXXIV., B, 2*), while there is a depression on the auricular septum, which is the remains of the *foramen ovale*, through which the blood courses in foetal circulation.

405. **The Ventricles** are the lower chambers of the heart, the left forming the apex. Inside the **ventricles** are seen the fleshy columns—*papillary muscles* (*Plate XXXIV., B, 14*)—from which run white fibrous cords, called *chordæ tendineæ* (*Plate XXXIV., B, 13*), to be attached to the auriculo-ventricular valves, their purpose being to limit the range of movement of the valves, and prevent them from being swept into the auricles during contraction of the ventricles.

406. Into the right auricle we have opening the *anterior* and *posterior venæ cavæ* (*Plate XXXIV., B, 1 and 5*) and the **coronary sinus** (into which the coronary veins open), while the four pulmonary veins open into the left auricle.

407. **The Pulmonary Artery** (*Plate XXXIV., B, 9*) arises from the right ventricle, and carries venous blood to the **lungs** to be oxygenated, while the **pulmonary veins** (*Plate XXXIV., A. J.*), which are generally four in number, bring back the purified blood from the lungs to the left auricle of the heart.

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THEIR DISORDERS AND DISEASES

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408. It will thus be seen that the *pulmonary artery* carries **venous blood**, and the *pulmonary veins* **arterial blood**.

409. Inside the *aorta* and pulmonary artery, just as they leave the heart, are the *semilunar valves* (Plate XXXIV., B, 10), three in number; on the free edges of these are small fibrous bodies, called the *corpora Arantii*. These valves, like the other valves of the heart, are to prevent regurgitation of the blood.

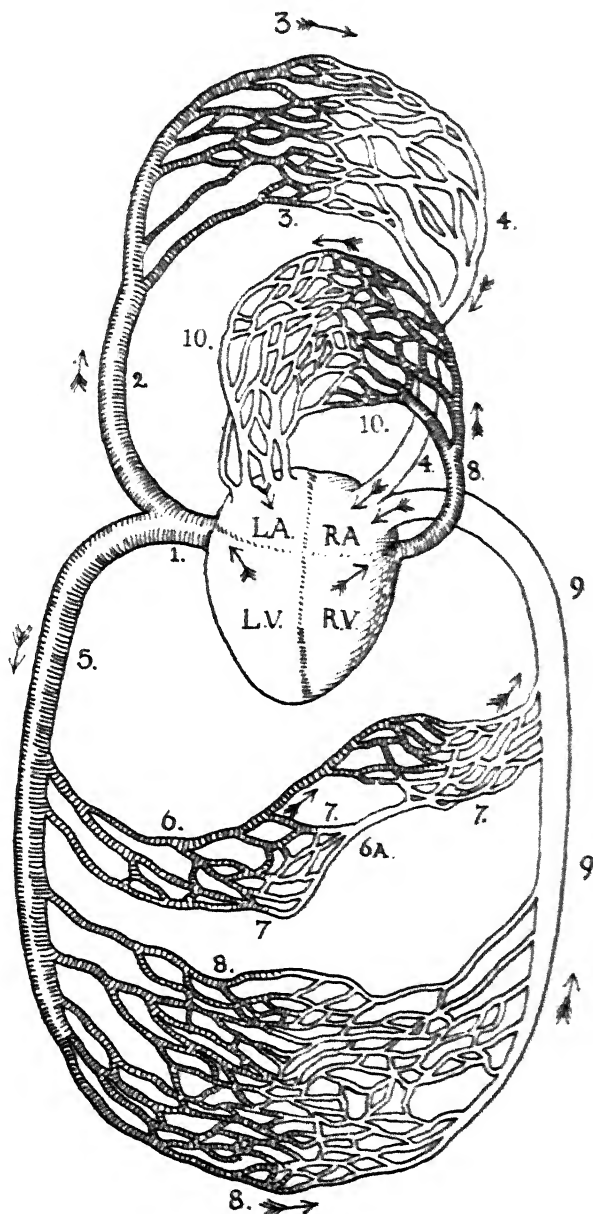
410. **The Aorta** (Plate XXXIV., B, 8) rises from the front and upper part of the left ventricle, and is the main stem of the arterial circulation. The common aorta is about two inches long, and divides into two great branches, one—the anterior aorta (Plate XXXIV., B, 6)—going to supply the head, neck, and fore extremities, while the other—the posterior aorta (Plate XXXIV., B, 7)—proceeds to the hinder parts of the body and limbs.

411. **Arteries** (Plate XXXV., 2 and 5).—These are the vessels which convey the blood from the left side of the heart to the various portions of the body. They are very dense and elastic, having three coats—viz., *internal*, lined by endothelium; *middle*, or contractile, consisting of non-striated muscular fibre and elastic tissue; and *external*, of areolar structure. The arteries anastomose frequently with one another, and finally terminate in the capillaries.

412. **Capillaries** (Plate XXXV., 3.3, 7.7, and 8.8).—This is a system, or network, of minute vessels, constituting the connecting medium between the arteries and veins. They are very small, being about  $\frac{1}{3000}$  of an inch in diameter. It is through their thin walls that the changes between the blood and tissues take place; the nutrient material is given out, and the effete products are taken up into the blood-stream and carried to the various excretory organs, such as lungs, kidneys, skin, etc., to be thrown off by them.

413. **Veins** (Plate XXXV., 4 and 9) are the vessels which return the blood to the right side of the heart. They, like arteries, have three coats, which, however, are not so dense, strong, or elastic, and they are, moreover, provided with pouch-shaped valves, to prevent

# PLATE XXXV



## CIRCULATION

- |   |                            |   |
|---|----------------------------|---|
| L.A. Left Auricle.  | R.A. Right Auricle.        | L.V. Left Ventricle.                        |
| R.V. Right Ventricle.   | 1. Common Aorta.           | 2. Anterior Aorta.                          |
| 3, 3. Capillary Circulation of Anterior Portion of the Body.  | 4, 4. Anterior Vena Cava.  | 5. Posterior Aorta.                         |
| 6. Hepatic Artery.  | 6A. Portal Vein.           | 7, 7. Capillaries of Hepatic Circulation.   |
| 8, 8. Capillary Circulation of Posterior Portion of the Body. | 9, 9. Posterior Vena Cava. | 10, 10. Capillary Circulation of the Lungs. |

The arrows show the direction in which the blood flows.



the back-flow of the blood. The walls of the bloodvessels are nourished by means of small vessels, called the *vasa vasorum*.

414. **The Portal Vein** (*Plate XXXV., 6 and 7*) forms a separate circulatory system. It commences in the sub-lumbar region, being formed by various vessels. It carries blood, which is charged with material newly absorbed, through the walls of the stomach and intestines from the food, and conveys it to the liver.

415. **The Circulation of the Blood.**—Through the medium of the large *venæ cavæ* the dark venous blood reaches the heart, entering by the right auricle, and, passing through the opening guarded by the tricuspid valve, it gains the right ventricle. From thence it is driven, by the contraction of the walls of the ventricle, into the pulmonary artery, and is carried to the right and left lungs, where it gives off carbonic acid gas and becomes charged with oxygen. This action changes its colour from a dark brown to a bright scarlet. The blood is then returned by the pulmonary veins to the left auricle, then through the passage guarded by the bicuspid valves into the left ventricle, whence it is forced into the aorta; thence through the arteries all over the body, carrying to the various parts nourishment, as well as oxygen, to keep up animal heat. When loaded with impurities it is again returned by the veins to the right side of the heart. Thus we have a double circulation, the right side being the **venous** or **pulmonary**, while the left is the **arterial** or **systemic**.

416. By the action of the heart—*i.e.*, by the contraction of the ventricles—the blood is forced into the aorta and pulmonary artery; this causes the arteries to dilate, and this dilatation, running in the form of a wave, pressed forward by the contraction of the arteries, and the force behind it, constitutes the **pulse**, which corresponds to the beats of the heart.

The horse's pulse beats from 38 to 43 times per minute.

The cow's	„	„	50 to 60	„	„
The sheep's	„	„	75 to 80	„	„
The pig's	„	„	70 to 80	„	„
The dog's	„	„	80 to 90	„	„

417. The number of beats of the pulse is not the only thing to be considered; the character of the volume of the vessel is to be taken into account as well, for the pulse may be *quick* or *slow*, *hard* or *soft*, *strong* or *weak*, *full* and *bounding*, *double* or *intermittent*, *corded* or *wiry*, *irregular*, *thready*, and *running down*. All these varieties have a significance and value in the diagnosing of disease.

418. In the horse the pulse is generally felt at the jaw or inner side of the forearm or fetlock joint; in the cow, at the lower part of the neck, opposite the shoulder joint, or at the inner side of the knee, or under the root of the tail; in the sheep, pig, and dog, it is felt for inside the forearm or thigh.

419. **The Blood** is a red fluid (of varying specific gravity in different animals—e.g., 1060 in the horse, ox, and pig), of which we recognize two kinds:

1. *Arterial blood*, of a bright scarlet colour.
2. *Venous blood*, of a dark brownish-red.

The difference in colour is due to the relative quantities of oxygen in each. Blood consists of:

1. *Liquor sanguinis* or *plasma*.
2. Red corpuscles—of which there are, it is estimated, about 204,113,750,000,000 in the body (Ellenberger).
3. White corpuscles—the number of which is estimated to be in proportion to the red as 1 : 335.
4. Some proteids, extractive and mineral matter.

420. **The Plasma** (*Liquor sanguinis*) contains water, proteids (some of which are capable of giving rise to fibrin), solids (not proteid in nature), *extractives* (including fat), and inorganic salts.

421. **The Red Corpuscles** are bi-concave, disc-shaped cells, without nuclei; they are said to be about  $\frac{1}{3500}$  of an inch in diameter; and it is to them that the red colour of the blood is due, from the iron (containing the pigment *hæmoglobin*) which they possess, and which is the oxygen-carrier to the tissues. The red corpuscles, when seen singly, are of a yellow colour, and float in

the middle of the blood-stream, moving along more rapidly than the white ones.

422. **The White Corpuscles** (or *leucocytes*, as they are also termed) are protoplasmic cells, and have no cell-wall, and are very remarkable bodies, which float more slowly along the sides of the vessels, in what is called the still-stream. They are larger than the red corpuscles, and seem to have a sort of life in themselves. It is believed that some of them (called *phagocytes*) have the power of killing the disease germs which attack the body. There is still some doubt as to the origin of the white corpuscles; it is thought by some that they are formed in the lymphatic glands; by others, that they are made in the spleen; while others think that they come from the middle parts, or medulla, the marrow of bone.

423. The disease-producing germs above mentioned—*microbes* or *bacilli*—surround us in millions, and enter the body by food, water, and air. Were it not for the watchful guard which these little soldier-like corpuscles keep, ready to pounce upon any intruders, these germs would speedily overrun the system, and destroy mankind and animals wholesale. Occasionally, indeed, when the body, from some cause or other, has become relaxed, and the phagocytes are unable to do their work properly, the disease-producing germs get the upper hand, and set up their own particular disease—as, for example, scarlet fever, etc. When once these germs get a footing in a human being, or in an animal, they develop and become more numerous, and capable of wide dissemination. After a time they appear to lose their potency, and the bodies through which they have passed seem to be rendered immune, and freed from subsequent attack. The epidemic dies out, but the germs remain latent in our midst, until, in the course of time, they seize hold of another susceptible subject, and again re-establish their virulence. At least, from the various periodical outbreaks of specific diseases, and the immunity given by inoculation, one is led to think such is the case.

424. **Proteids.**—The proteids of blood are plasma, fibrinogen, serum albumin, serum globulin, and fibrin ferment; of these,

fibrinogen, when acted upon by fibrin ferment, gives rise to the fibrin found in clotted blood.

425. **Extractives.**—These are of two kinds—viz., nitrogenous and non-nitrogenous. The nitrogenous extractives are urea, uric acid, hippuric acid, creatin, creatinine, xanthine, and hypo-xanthine; the non-nitrogenous are fats, soaps, cholesterine, and sugar.

426. **Mineral Matter.**—The salts in solution in the blood are chiefly the salts of potash, soda, lime, and magnesium, phosphates, and iron; of these, by far the most plentiful is common salt, or chloride of sodium, of which the ash of human blood is said to contain as much as 54 per cent. This substance (salt) must, therefore, play an exceedingly important part in the body, and, from its presence and great germicidal properties, may, doubtless, assist the opsonin and the phagocytes in their work of protecting the system from the invasion of disease-producing germs.

427. **The Clotting of Blood.**—When blood is drawn from the body, it does not remain fluid, but in a short time forms into a jelly-like mass. Then, if left to stand for a few hours longer, it separates into (1) the *crassamentum*—a firm red clot, consisting almost entirely of red corpuscles, entangled in a network of *fibrin*—and (2) the *serum*—a clear, pale, straw-coloured fluid, in which the clot floats. **Fibrin** is, normally, only produced when the blood is shed, or in some other way deprived of its vitality. Sometimes, under abnormal conditions, fibrin may be produced in the living body, such as in the *ante-mortem* clots, found in the heart and bloodvessels.

428. **Serum** may be considered as plasma from which the fibrin-forming elements have been removed during clotting. It contains proteids, extractives, and salts, just as the plasma does. The extractives and salts are the same in both fluids; but the proteids of serum are serum albumin, serum globulin, and fibrin ferment.

## PART II

## THE LYMPHATIC SYSTEM.

429. The **Lymphatic or Absorbent System** is made up of numerous vessels of various sizes, and small bodies, also of different sizes, called **glands**, and is intimately connected with the circulatory system. The absorbents originate in a very fine network communicating with fine delicate tubes, which are more numerous than the capillaries of the bloodvessels, and are found in almost every structure of the body, being both deep-seated and superficial. The walls of the larger vessels have three coats, and, internally, they are supplied with valves which give them a beaded appearance when distended.

430. A number of the smallest of these absorbent vessels (*afferent vessels*) will be found running to the **glands**. These are present in almost every portion of the body, and are of various sizes, being usually named after the region in which they are found—for instance, the *mesenteric glands* in connexion with the intestines, and the *bronchial glands* associated with the lungs. These glands give off other vessels (*efferent vessels*), which are slightly larger, and these again pass to other glands, and so on, until they end in one or other of the two large trunks—i.e., the *thoracic duct* and the *right lymphatic vessel*, the former being the larger of the two.

431. **The Thoracic Duct**, a vessel which carries a mixture of both *lymph* and *chyle*. The **lymph** is a colourless fluid that is absorbed from the various tissues of the posterior portion of the body and hind extremities, also from the left side of the head, neck, thorax, and left fore-leg. The **chyle** is a milky fluid that is prepared during the process of digestion, and is taken up by the **lacteals** or lymphatic vessels and carried to the **receptaculum chyli**, a large vessel or reservoir situated in the lumbar region between the posterior aorta and *venæ cavæ*, wherein it mixes with the lymph, and is then conveyed by the *thoracic duct* into a vein near the heart (*par. 223, Nos. 7 and 8*)

432. **The Right Lymphatic Vessel** is a receptacle for the *lymph* that is taken up by the absorbents on the right side of the head, neck, thorax, and right fore-leg, and it empties itself into the venous blood-stream near the heart, generally at the confluent vein of the jugulars.

### PART III

## DISEASES AND DISORDERS OF THE CIRCULATORY AND LYMPHATIC SYSTEMS.

433. **Heart Diseases.**—These, though of frequent occurrence in the human subject, are not so common in the horse. The cow, however, is more often affected, generally with traumatic heart disease, from foreign bodies, such as pins, needles, etc., finding their way to the heart from the stomach. Heart affections may be said to be of two kinds—(1) *functional*, and (2) *organic*.

434. **Functional Derangement of the Heart** in the horse arises from a variety of causes, but is mainly due to some stomach or liver disorder, the nature of which should, if possible, be ascertained and suitable treatment adopted. In these cases the pulse is, as a rule, very irregular and intermittent. The animal is very dull, hanging its head and breathing slowly, and is off its food. The under side of the eyelid and the mouth is also of a dirty yellow colour and foul, the mouth and tongue being coated with thick mucus. When these symptoms are observed, the following medicine usually gives great relief: 1 drachm of calomel and 2 drachms each of powdered aloes and powdered rhubarb, made into a ball with a little treacle, followed up by  $\frac{1}{2}$ -ounce doses of bicarbonate of soda, night and morning, in a mash. The above treatment is for an ordinary adult agricultural horse; for other classes of horses the dose must be regulated. Functional derangements of the heart may also be due to some obstruction in the bloodvessels.

435. **Organic Disease of the Heart.**—In the heart of the horse some of the following changes are at times seen, such as *vascular fibrinous* and *bony tumours* in the cavities, and sometimes, also, attached to the valves of the heart, all of which have generally a

corrugated appearance. *Fatty degeneration* and *fatty infiltration* of the walls of the heart are now and again also met with, the two latter generally in complication with a somewhat similar condition of the liver. But the most of these lesions are only made manifest at the post-mortem examination. The most common form, however, of heart disease in the horse and dog is that termed *hypertrophy*.

436. **Hypertrophy**, or **enlargement**, of the heart may be considered as follows :

- (1) Hypertrophy without dilatation, when the walls of the heart are thickened, but the capacity of the cavities remain unchanged.
- (2) Hypertrophy with dilatation, when the cavities are enlarged as well as the walls being thickened, and when the heart is enlarged throughout, with the walls very thin, flabby, and pale, and the cavities dilated.

437. **Atrophy**, or **attenuation**, of the heart is an affection where not only is the organ itself much smaller than normal, but the walls and cavities are also diminished.

438. When a horse is noticed, while pulling a load up a hill, to stop every few steps almost breathless, to have dilated nostrils and staring eyes, and the heart beating with a thumping sound loud enough to be heard, or fluttering with an irregular sound while the pulse is scarcely perceptible, and there is a waving flow in the jugular vein up the neck, it may be then set down that some heart complication is present. A slight canter will produce similar symptoms with an affected horse. Owing to the thick walls of the sides and front of the chest of all the domestic animals—with the exceptions of the dog and cat—the sounds of the heart are very difficult to define, thus making it almost impossible to distinguish one disease from another by sounding. The best mode of detecting the sounds of the heart of the horse is to lift the near fore-leg, pull it well forward, and apply the ear to the side behind the elbow. *Treatment* for a diseased heart is of little avail ; but the horse may live a long time, and do a lot of farm work, so long as it is slow and easy. As the legs are inclined

to swell, preparations of iron, digitalis, and potash will assist materially in giving tone to the animal (*par. 1073, No. I.*).

439. In the examination of horses as to **soundness**, it is of the greatest importance to note the state of the pulse, and the sounds of the heart, as well as those of the breathing. I have met with cases said to be 'broken-winded,' when, on examination, heart disease was found to cause the difficulty in breathing.

440. Acute cases of diseases of the heart and its covering—the **pericardium**—are frequently associated with severe attacks of *pneumonia, pleurisy, influenza, pink-eye, rheumatic affections*, etc. Here the covering of the heart becomes intensely inflamed, producing fibrinous deposits and effusion of water into the chest and pericardial sac (*hydrops pericardii*). These cases are so complicated and so rapid that they require early and judicious treatment, as they are frequently fatal. A horse—particularly a stallion—fed up for sale on too much starchy matter, such as boiled wheat, potatoes, etc., and having little or no work to do, is subject to sudden general congestive febrile attacks affecting the whole system, when, from the hurried circulation, fibrinous strings form round the tendinous cords in the ventricles, and accumulate so fast that the animal dies from failure of the heart's action by this ante-mortem clot of yellow fibrinous, fatty-looking material blocking up the passages through the heart and the large vessels.

441. In the old farrier days, when bleeding was so much run upon, these cases were bled four or five times in twenty-four hours. This repeated bleeding tended to increase the fibrinous matter in the blood, so that, instead of relieving the animal, the operators only assisted in killing it, and on post-mortem the verdict was that it had died from *grease at the heart*. These cases require prompt treatment. If bled at all it should only be once, and at the very first. The animal ought to be kept quiet, and given plenty of ammoniated nitrate water to drink (*par. 1067, No. VI.*).

442. **The Cow**, as already noted, suffers more from heart diseases than the horse, owing to foreign bodies passing through the walls of the stomach to the heart. The animal may go on feeding and doing



well without the slightest symptom of anything being amiss, until one day it is found dead—post-mortem examination revealing the cause to be a needle, wire, or some such body (of which I have quite a collection), sticking in the heart or its covering. Sometimes the animal is very lame, and on close examination an enlargement is found in the side behind the elbow, which on cutting into is found to contain perhaps a large needle or pin. Again, in other cases the symptoms are that the animal begins to lose flesh and milk, feeds badly, rarely chews the cud, and shows all the symptoms of a '*piner*,' having a dry ticklish, barking cough, standing with the hind-legs down in the gangway of the byre, the belly tucked up and sides dropped in, the breathing short and slightly quickened. But the most confirming symptom is the jugular vein being greatly enlarged, sticking out as thick as the handle of a hay-fork, with a wavy pulsation in it. As the case progresses watery swellings are seen under the jaw, and on the lower side of the neck and dewlap, while the pulse is so small and quick as to be scarcely perceptible. On applying the ear to the flat or bottom of the sternum, just behind the elbow, the heart can be heard splashing in the water with a peculiar tinkling, running sound. This symptom may be due to some foreign body sticking in the pericardium, or to chronic inflammation of the pericardium from other causes; one prominent cause being the retention of the second cleansing, the flow of which may have been checked by east wind chills, or from too early removal of the cow after calving, etc. (*par.* 807). The animal at first falls slightly off its milk and food, and the complaint steals on gradually, until it ends in hydro-pericarditis. *Treatment* is very unsatisfactory. Saline medicines, combined with iron and vegetable tonics, can be tried (*par.* 1059, No. II.).

443. **A Young Animal**, under twelve months old, when fed on too nitrogenous a diet, such as decorticated cotton cake, suffers sometimes from *congestion of the lungs and heart*. It has a dry, husky cough, the head is stretched out and held low, *jugular vein full*, breathing quick with a sharp grunt, while the movement of the flanks is rapid, and there is generally foaming at the month; in fact, at the first glance, the case resembles quarter-ill. Such cases usually

terminate fatally, and the animal should be slaughtered early. Cotton cake of any sort should never be given to animals under twelve months old.

**444. Thrombi**, or plugging of the bloodvessels, are occasionally met with in the horse. They generally make their appearance after a hearty drink of cold water while the animal is heated, or when a horse has had a long, quick journey, and is pulled up for a time. On re-starting, it is found to be intensely lame on one of its legs—usually a hind one; in fact, it can scarcely move. The limb has all the appearance of being paralyzed, only the animal can move and stand on it; but it does so with great difficulty and pain, and perspires freely. As the case proceeds, the veins are seen to be varicosed, the leg begins to swell, and is very painful to the touch. There is a great deal of constitutional disturbance present, the animal taking little or no food. These cases take a long and tedious time to recover. The acute febrile symptoms must be combated with mild laxatives and sedative medicine. There is also a chronic form of this disturbance, which is accompanied by swelled legs, varicose veins, and a peculiar clumpy action of the leg. Diuretics, with iron tonics and long rest, answer best in these cases (*par. 1073, Nos. I. and II.*).

**445. Phlebitis**, or inflammation of a vein—more particularly the jugular vein—is not so often seen nowadays, being generally caused by too frequent or unskilful bleedings, especially in the case of overfed animals of a febrile tendency. When in the jugular, the vein is noticed to be very much swollen from the opening up to the animal's head, with a mattery discharge from the wound. When first observed, a smart blister applied over the enlargement generally has the desired effect. Some cases, however, are met with in which it is necessary to pass a seton along the engorged portion of the vessel, and to tie up the animal short to the rack. Nearly all the cases terminate with obliteration of the vein, and this requires careful attention in examination for soundness.

**446. Azoturia, or Nitrogenous Urine**, is due to an overloaded state of the system, and occurs usually amongst horses which are too

well stall-fed, and have too little work or exercise. It is more particularly met with after a spell of frost, during which time the animals have had a term of enforced idleness, without the necessary care and attention having been paid to their dieting. Mares are even more acutely affected than horses. *Symptoms.*—On the animal being taken out of the stable, it seems to be possessed of more life and high spirits than usual, and rushes off on its journey in great form, but does not proceed far—generally from half a mile to two miles—before it begins to flag, wants to stop, and breaks out into a most profuse perspiration, the back becomes arched, and the hind-legs stiffen, etc. Though the difficulty is great, the animal should be got into a stable, when, if a mare, it may throw itself down, and commence to strain, as if in the act of foaling, ejecting from its bladder large quantities of dark-brown, coffee-coloured urine. A horse, on the other hand, generally stands leaning against the stall or wall, pressing its head in the manger, perspiring freely, breathing quickly, with a full, strong, corded pulse, while the eyelids and other visible mucous membranes are highly injected. Quantities of the same peculiar coffee-coloured urine are passed at intervals with great straining. *Treatment.*—Owing to the sudden onset and severity of the attack, I know of no other complaint affecting the horse for which bleeding answers so well or has such a decided beneficial action, unloading, as it does, the overcrowded system sooner than anything else. From 6 to 10 quarts of blood may be taken, according to the size of the animal, at the same time 4 to 7 drachms of aloes made into a ball, or from 1 to 1½ pints of linseed oil can be administered, followed up by 4-drachm doses of bicarbonate of potash in drinking-water every eight hours. Hypodermic injections of adrenalin has in some cases had a beneficial effect. If the attack is allowed to run its course, the animal, as a rule, dies, or if by chance it recovers, it is worthless for a very long time, the muscles of the loins being infiltrated with blood from the rupturing of the muscular tissue and bloodvessels, caused by the excessive straining. To prevent the occurrence of this troublesome disorder, animals should be regularly exercised daily; if this is not practicable, they must be put into a loose-box and lightly fed as long as their period of idleness lasts.

**447. Purpura Hæmorrhagica, or Purple Bleeding.**—This is an eruptive, non-contagious, febrile affection, most frequently found in the horse, and following in the wake of some debilitating disease, such as catarrhal fever, influenza, strangles, diabetes, etc., or it may arise spontaneously without any previous derangement. It is of more common occurrence in town than in country practice. *Symptoms.*—When an animal is evidently on the way to recovery from a severe attack of influenza or some such disease, it may all at once be found with swelled legs, eyelids, nose, and mouth, and patchy swellings all over the body, while, on closer examination, dark purple blotches are seen inside the nostrils. The breathing becomes much quicker, and the pulse is small and fast, while there is a yellow discharge from the nostrils. Occasionally the swellings about the head are so large that the breathing is oppressed to such an extent that suffocation is threatened, and tracheotomy must be performed, while the limbs may become so much swollen that the animal can scarcely stir, and has at length to be supported on slings. *Treatment.*—When first observed, the horse should at once be put in a loose-box, where it can have a plentiful supply of fresh air, and, when necessary, it ought to be put in slings. Milk, linseed jelly, and eggs beaten up in milk may be given, as well as green food and boiled barley, if it has any appetite. All the food must be light and easy to digest. Light laxatives such as 2-ounce doses of hyposulphite of soda can be given, night and morning, in sloppy mash or drinking-water; chlorate of potash in 2-drachm doses every four or six hours (given in drinking-fluids), answers well; while repeated intravenous injections of adrenalin eases the blood-pressure and diminishes extravasation. But the malady being of such a formidable character, the patient should be placed at once in the care of a veterinary surgeon, as in many difficult cases, by the injection of preparations of iodine in solution into the windpipe, many animals have been saved.

**448. Influenza and Pink-Eye.**—These are described under 'Respiration' (Lecture IX.).

**449. Urticaria, Blaines, Howkes, or Nettle-Rash.**—This is another blood affection of a non-contagious and non-febrile type,

analogous to what is termed 'musselling' in the human subject. It is characterized by the sudden springing up of patchy, elastic swellings all over the body, which, however, cause little or no distress to the animal, and may disappear quite as suddenly as they came. The cause is generally traceable to some strange food, or quality of food, being given to an animal, such as the first feed of new grass, new hay, or oats, Indian corn, etc. *Treatment*.—For the horse, from 1 to 2 ounces of bicarbonate of soda, or the same quantity of hyposulphite of soda, dissolved in 1 pint of cold water, to which is added  $\frac{1}{2}$  pint of whisky, if given when first observed, will generally be found to have the desired effect.

450. In the *cow* this complaint is most frequently met with during the spring months, when stock are changing their quarters. The head, eyes, ears, neck, and the base of the tail are swollen up, while the skin all over the body feels much thicker and harder than usual. The swellings at times are so extensive in the region of the neck and head that the animal foams at the mouth, and shows all the symptoms of choking. Formerly cattle-dealers and drovers, on observing a case of this nature, used to cut the partition dividing the nostrils and let it bleed, while farmers used to get very excited, and were in a great hurry to have the animal bled, thinking that they could not take too much blood away. By this heroic and foolish treatment I have seen many subjects bled to death. All the *treatment* that is necessary is to give the cow a wineglassful of turpentine in a pint of linseed oil or milk, or 2 ounces either of bicarbonate of soda or of hyposulphite of soda may be given in 1 pint of cold water, to which  $\frac{1}{2}$  pint of whisky has been added. After this the animal should be left alone, and a little patience exercised on the owner's part.

451. **Lymphangitis, Weed, Shot of Grease, or Monday Morning Complaint**, consists of inflammation of the absorbent vessels, and most frequently affects the hind-legs of horses; occasionally, however, it is met with in the fore-legs. It generally appears on Monday mornings after Sunday's rest—and perhaps overfed—and affects heavy horses, more particularly the sluggish, gummy-legged

ones. From the suddenness of the attack and the extreme pain evinced on touching the affected limb it, to my mind, greatly resembles gout in the human subject. Nineteen people out of twenty are in the habit of calling this a '*shot of grease*,' whereas in reality there is no grease about it, grease being purely a skin disease (*par.* 668). *Symptoms.*—In some cases the attack is ushered in by a shivering fit, while in others the first symptom noticeable is a sudden and extreme lameness in one leg, on touching which great pain is evinced even before any swelling makes its appearance, while patches of sweat may be observed on the limb. The large vessels running up the inside of the leg soon begin to enlarge, as well as the glands in the groin, and excessive lameness and pain accompany any attempts to move. General swelling of the limb then takes place, on the appearance of which the pain diminishes a great deal, most of its acuteness being lost. In some cases there is a considerable amount of constitutional disturbance, but in others very little or none is observable.

452. *Treatment.*—In very acute cases, where the animal is suffering great pain, taking from 4 to 6 quarts of blood from the neck (jugular vein) gives great and quick relief. Some people bleed from the toe of the affected limb, but this I do not approve of. The treatment I adopt, and which I can strongly recommend, is to put a bandage-syme—made of soft meadow hay, not too tightly twisted—round the limb, commencing at the foot, and rolling lightly and loosely round up to the top of the affected limb, and when once in position soaking it well with several pailfuls of cold water, repeating this action every three or four hours. In scores of cases I have seen the animal get great relief from this treatment in less than an hour. Linseed oil—from 1 to 1½ pints—may be given, followed up by 3 to 4 drachm doses of nitrate of potash every eight hours in drinking-water. When the pain and lameness have gone, which is usually the case as the limb becomes thickened, the swelling is then best reduced by gentle exercise. Iron tonics, with diuretic medicine, may be given every night with much benefit (*par.* 1073, Nos. I. and III.). In very excitable cases aloes balls should be used with

extreme caution (*Inflammation of the Bowels, par. 260*). Animals once affected are subject to subsequent attacks, and may ultimately end with their having a chronic thick leg, which in some cases gets to an enormous size. This is called *elephantiasis*.

453. **Elephantiasis** (*Plate XXI.*) consists of a chronic abnormal thickening of the connective tissues beneath the skin. The horse may continue to do slow work on the farm, feeding and doing well, but the leg is very unsightly. I have had best results from applying a cold-water hay bandage to the leg every night, while tarring the limb and giving a winter's run at grass have also a wonderfully good effect. Liniments of a slightly stimulating nature may also be used, but I have tried blisters, setons, etc., without any avail.

454. **Inflammation of the Lymphatics** is a corded, painful enlargement of the vessels, and is frequently induced in the limbs by injuries, such as wounds, thorn-pricks, bruised ankles, and cracked heels. In some cases the vessels are enlarged to such an extent that the gland at the top and inner part of the leg becomes so much inflamed that often an abscess is formed, which, if it does not burst of its own accord, has to be opened and the matter liberated. *Treatment.*—The leg should be dressed with an antiseptic mixture, and alterative tonic medicine given night and morning (*par. 1073, No. III.*).

455. **Lymphangitis Epizootica**, or septic inflammation of the lymphatic vessels and the formation of ulcerative sores of a contagious character. The malady simulates glanders and farcy, but differs from them in the absence of the glanderous bacilli, and does not react to the mallein test. The disease was prevalent in the late South African War, and is mostly of a chronic nature. It makes itself manifest by enlargement and thickening of the lymphatic vessels, which seem like branches of a tree on different parts of the body, but the limbs particularly, with the formation of abscesses and ulcers. On account of its contagious nature, it should not be dallied with, but reported to the authorities at once.

456. **Swelled Legs and Sheath.**—During the winter months, when horses are stall-fed and have thick coats of hair, they are

frequently seen with thick legs, and occasionally the sheath becomes swollen and pendulous. This is generally due to want of condition or to giving them too much boiled food of a 'slushy' nature, such as boiled turnips or potatoes and cut corn sheaves. Soft unconditioned hay or oats will have a similar effect. If the food be at fault it should be changed at once and the sheath well washed out with soap and water; then the administration of iron tonics, combined with suitable diuretics, will soon remedy the mischief (*par. 1073, No. I.*). The best treatment, however, is to clip the hair off the animal, and feed with well-conditioned corn and hay.

457. **Epidemic or Epizootic** diseases are more or less affections of the blood, caused by small solid bodies, called microbes, bacteria, or bacilli, which grow and multiply with great rapidity in the blood, and produce characteristic diseases, just as turnip seed and clover seed produce turnips and clover respectively—plants that are very distinctive from one another.

458. **Anthrax or Splenic Apoplexy.**—Although this is a disease of the blood, it has already been noticed under 'Digestive Organs,' Part II. (*par. 324*).

459. **Black-Quarter, or Quarter-ill,** is due to a minute germ, which locates itself in some of the tissues of the body, where it increases in number with great rapidity, causing in due course morbid alteration of the tissues of the part affected, the generation and evolution of gases, with subsequent derangement of the blood and consequent death. It attacks various parts of the body, particularly the *limbs, loins, and shoulders*. It is most frequently seen in young animals from six months to two years old, but even those older are by no means exempt from attack. As a rule, the best thrivers, or those in the most forward condition, are the first to be affected. In young stock it is invariably fatal, while aged animals occasionally make good recoveries. Black-quarter is not now of nearly so common occurrence in the North of England as it was some years ago. This is owing to the better sanitation and improved mode of feeding now adopted, specially to the fact of not allowing



the animals to lose their calf-flesh, but feeding them steadily on. The disease is regarded by some as a species of **anthrax**, and is called **symptomatic anthrax**; but there is a decided post-mortem difference present, in so much that the *blood* of an animal dead of *anthrax* proper *will not coagulate*, while that of an animal dead of *quarter-ill* will. I have known of numerous affected animals (young overfed bulls in particular) being slaughtered, and the damaged portion cut off and destroyed, while the remainder of the carcass was sold as food for human consumption. Although I never heard of any bad result following, yet I do not subscribe to the system, for it is a dangerous proceeding, and all animals so affected should be either scheduled or brought under the notice of the authorities.

460. The *symptoms* of black-quarter or quarter-ill to be first noticed are that the animal seems very languid, breathes quickly, and hangs its head, while the white of the eye has a *peculiar pale, cold, steely hue*. Lameness may also be present in one of the limbs. On examining the body, the confirming symptom will be a puffy swelling, which, when the hand is passed over it, gives a crackling sound and feeling. All sorts of remedies have been tried, but I never knew a case of a young animal recovering when once attacked. *Treatment*.—In adult cases I have had most success with the following prescription—namely, 1 ounce of hyposulphite of soda and 1 ounce of charcoal, given every six or eight hours in water, and 10 to 15 ounces of linseed oil given every other day. The temperature in all the cases ranged from 104° to 106° for seven to ten days, little or no food was taken, while the affected parts made very slow recoveries.

461. Numerous *preventive* measures have been suggested and tried for this affliction, such as tablespoonful doses of turpentine in  $\frac{1}{2}$  pint of linseed oil twice a week, or  $\frac{1}{2}$ -ounce doses of saltpetre in 1 pint of water, at like intervals, etc.; but the best preventive I have found is to insert a seton—a piece of white linen tape smeared over with a little blister ointment—on one side of the dewlap, in September or October. I have treated some hundreds in this manner, and have never yet seen one animal which had been setoned become

affected with black-quarter. Other preventives now recommended are the inoculation of the young animals with preparations made from the diseased parts of an affected beast, injected direct into the blood, through the walls of the jugular vein, which has to be dissected out for this purpose, or to inoculate the young stock with black-leg vaccine, which is introduced under the skin by means of a special instrument. The preparations are very delicate, and have to be repeated, and I fail to see how it can be an improvement on the old seton, with the facts before named within my own experience of nearly sixty years. The best plan, however, is to keep the animals indoors until they are twelve months old, giving them good lodgings, dry beds, good drainage, and nutritious food, such as linseed cake, crushed oats and bran, with a little salt. Were this treatment followed out, very little, if any, black-quarter would be seen.

462. **Rinderpest, or Cattle Plague**—an acute specific, contagious, and malignant typhoid disease, which runs its course in a very short time. The noticeable symptoms consist of elevated temperature, quick breathing, pulse scarcely perceptible, watery discharge from the mouth and nostrils, drooping head and ears, trembling and twitchings of the muscles all over the body, coat on end, and dirty eruptions and ulcerations seen in the mouth and vagina. Death, very soon, is the invariable accompaniment. This disease is under the Contagious Diseases (Animals) Act, and really is of a very contagious and highly infectious nature. The disease is an imported one; happily, however, it has not visited our shores for some time. Anyone wishing for further particulars and details respecting this disease should refer to the revised ninth edition of Williams's 'Principles and Practice of Veterinary Medicine.'

463. **Foot and Mouth Disease, or Murrain**.—A contagious, eruptive, vesicular, febrile disease, in which the mouth, feet, and udder are affected, with, at first, small eruptive vesicles, which afterwards burst and form ulcerating sores. The bacilli the cause have just lately been discovered by Dr. Siegel. Some cases are of a more acute nature than others; and, again, we may have the mouth attacked and the feet free, and *vice versa*. It affects cattle, sheep,

and pigs—young pigs especially at times suffer severely and die suddenly when the morbid material gains admittance to the body. The *period of incubation* varies from one to four days, with an elevation of temperature from  $2^{\circ}$  to  $5^{\circ}$ . The most prominent *symptoms* are saliva foaming from the mouth, with a *distinctive peculiar smacking of the lips and tongue*; the feet occasionally are so sore that the animal does not dare to move them, unless by twitching them up in a very abrupt manner; the vesicles may be noticed as before mentioned. This disease is scheduled under the Contagious Diseases (Animals) Act, and when the malady makes its appearance those animals affected, and others which have been in contact, are now generally slaughtered to prevent the disease spreading. I have seen a great number of outbreaks, and although the disease did not prove very fatal, yet it caused a great loss to stock-owners; especially was this so in dairy and breeding herds, the greatest loss being from calving cows casting their calves and retaining the after-birth, this being complicated with sore udders, etc.

464. When allowed to treat the cases, my great object was to try and assist Nature in preventing the animals from aborting, and for this purpose I found that  $\frac{1}{2}$ -ounce doses of chlorate of potash, given once a day, had a marvellous effect, as the following instance will show: On one occasion, in 1875, when foot and mouth disease broke out, the stock belonging to the late Sir Wilfrid Lawson, Bart., at Brayton, were considerably affected. In order that the disease might run its course speedily, all the cattle, affected and unaffected, were brought together and put into the large park. These were dosed daily with chlorate of potash, given in bran mashes. The result of this treatment was that, out of about 200 head of cattle, only 98 took the disease, and all of them recovered; 35 of the affected cows were in calf, and they all went up to their full time—not one aborted; there were no sore udders, the calves were a fine crop, and both mothers and offspring did well. I subsequently, on several occasions, tried the chlorate treatment with a like success. When the feet are much affected heavy animals suffer greatly. I have seen bulls and heavy shorthorn cows lie for weeks. A thick

bed of dry sawdust or moss litter answers well in such cases; and when the bones of the feet are exposed, and the claws spread apart, antiseptic dressings should be secured over the parts with the figure-of-eight bandage. Milk from the ailing cows quickly affects young calves and pigs, and this often fatally. It should, therefore, never be given to animals until it has been well boiled, yet I have seen farm servants drink the milk fresh from such animals without any ill-effects.

465. **Red-Water, Black-Water, Muir-Ill, or Hæmo-Albuminuria.**—Known in America as *Texas fever*, *tick fever*, and in the Argentine as *La Tristezza*. A deterioration of the blood and disintegration of the red corpuscles, mostly found affecting cattle, yet I have seen two cases of it in horses. In both of these latter subjects the urine was of a dark port-wine colour, but there was little or no accompanying constitutional disturbance, the animals merely appearing dull and languid, with a great absence of appetite, for two or three days. Both cases readily yielded to saline laxative medicines, supplemented with boiled barley and bran mash containing a little salt. These animals had been grazed on pastures on which red-water in cattle was very prevalent, several of the cows on the pasture being affected at the same time. The disease, although due, in the first instance, to some peculiarity of the food, may be regarded as a deterioration of the blood, and the most striking symptom is the dark red or black colour of the urine, which is passed from the bladder in a slow, jerking, spiral stream, causing a bubbling froth as it falls on the ground; but there is no coagulation, or blood-clot, as is seen when there is hæmorrhage from the kidneys, ureters, or bladder. Formerly, this used to be a very common malady in the North of England; but improvements of late years in the drainage, and the application of artificial manures, have gone far to make it a disease of rare occurrence. Forty to fifty years ago, it was nothing uncommon to see ten or twelve cases in as many hours; but during the last thirty years, I have had very few cases. I have never seen it follow parturition, nor have I seen it in a bullock or young calf, and only thrice have I seen it affect stall-fed animals; these cases were, however, very slight, and soon recovered.

466. The lands principally affected are poor, undrained, shivery gravelly pastures, and sour, wet mosses where the herbage is of a coarse, acrimonious nature, in which acrid plants such as tormentil abound. The malady generally makes its appearance in the summer and autumn months—August and September especially—following, usually, a sharp, heavy rain after a spell of dry weather, when the grasses spring up rapidly, and, under these conditions, the complaint is rife. Cattle bred and reared on the above-mentioned soils are, however, more immune from attack than those reared on good land, and brought on to the bad to graze. I am strongly of opinion that the disease is due to a want of a normal quantity of saline matters in the food, which, in turn, interferes with and destroys the balance between the solids and fluids of the blood. As already shown, blood contains a large proportion of salt, and has, in fact, a soft saline taste. Now, on account of the acid nature of the food obtainable on these sour pastures, a sufficient amount of saline material is not conveyed to the blood to preserve the equilibrium between the solid and fluid parts, so that the watery portions, by endosmosis, pass through the cell walls of the red corpuscles, and so distend them that they burst, and they then pass through the excreting water tubes—uriniferous tubes—of the kidneys into the urine, accompanied by the colouring matter of the blood, which they have thus liberated, giving to it the red colour noted, and instituting the name of the disease.

467. Of late a great deal has been published respecting the tick *Ixodes ricinus* being the cause of red-water in cattle. This may be the case in foreign countries, and the disease carried from one animal to another by means of the tick, but I must say that of all the cases I have seen—and they have been no small number—I have only on four occasions seen ticks on cows affected with red-water, and at the same time other cattle going with them ailed nothing, although they also had ticks on their bodies. The most of my cases have been on poor, badly drained, shivery, gravelly pastures, or on sour, wet, low-lying, undrained mosses, where the herbage was of a rank, sour character, and these particular pastures have been situated in the midst of well-drained, highly cultivated lands, on which cattle in

good health and free from the malady were grazing, and only separated from the diseased beasts by a fence, over which the cattle could smell and lick each other, and yet the complaint did not extend to the cattle on the sound land. Although I have examined the blood of a cow suffering from red-water through the microscope and seen little micro-organisms—the *Piroplasma bovis* (*bigeminum*)—in the red corpuscles of the blood, I still hold the opinion that the predisposing cause of the disease is in the nature of the soil and quality of the food, inducing a condition of the blood that the micro-organism finds suitable for its development. It would seem, however, that red-water in cows arises under varied conditions—viz., after calving, grazing on undrained pastures and mossy soils, following, in some quarters, a heavy rain after a long spell of dry weather, as well as to the influence of the tick.

468. The following analysis by the late Professor Sibson, F.C.S., London, was determined from a sample taken from a case I had :

#### Analysis of Red-Water from Cow.

Water .. .. .	93.98
Solid matter in solution .. .. .	6.02
Consisting of organic matter .. .. .	4.48
Containing—	
Urea .. .. .	2.40
Albumen .. .. .	1.72
Extractives and colouring matter .. .. .	0.36
And of mineral matter .. .. .	1.54
Containing—	
Sodium chloride .. .. .	0.71
Calcium and magnesium phosphates, containing alkaline phosphates .. .. .	0.13
Potassium sulphate .. .. .	0.29
Other saline matters not determined .. .. .	0.41

469. *Symptoms*.—When first noticed, the animal suffering from red-water is generally seen standing by itself in the field, with nose extended and an anxious expression on its face; when it moves, it is in a very listless fashion. On closer examination, the breathing is found to be short and quick, the pulse jerky, tremulous, and weak, and

the heart going at a great pace, whilst it can, in many cases, be heard beating loudly at a distance of 5 or 6 feet from the side of the patient. In milkers the secretion is suspended, the nose, eyes, mouth, udder, and vagina have a dirty yellow cast, while the lips of the vulva have a tight, puckered-up appearance, and the urine has, as already stated, its characteristic red colour. The animal will take neither food nor water, and in the first stages is affected with diarrhœa. As the disease advances, all the symptoms become aggravated, but an obstinate constipation takes the place of the diarrhœa. In my opinion, this suspension of the action of the stomach and bowels is due to the deteriorated blood acting on the nerve centres, causing perverted action, or, in a degree, paralysis of the nerve fibres supplying the alimentary tract, and the poor brute's condition becomes much more aggravated by the owner, on seeing this symptom, pouring into it large doses of relaxing purgatives, which only hurry it on to dissolution.

470. *Treatment*.—The treatment I recommend as soon as the animal is observed to be affected is to give it from 14 to 20 ounces of common salt in 2 quarts of gruel, and then to place in front of the patient a large pailful of hay, nettle, or bran tea, or cold water and milk in which from 2 to 3 ounces of hyposulphite or bicarbonate of soda is dissolved. This must be renewed as soon as the patient drinks it. It should be followed by 20-ounce doses of linseed oil, to which is added 2 ounces of turpentine. Should the bowels not respond, 4-ounce doses of hyposulphite of soda may be given along with warm cordials, such as 1 ounce each of ginger, gentian, sweet pepper, mustard, etc., in 2 quarts of warmed ale, or in gruel containing  $\frac{1}{2}$  pint of whisky, every six or eight hours. I have found this treatment to be very beneficial. A subcutaneous or intravenous injection of a preparation of trypanblue is now supposed to not only destroy the parasites in the blood, but also to render the animal immune.

471. *Prevention* consists in first draining the land, and then dressing the particular grazing pastures affected every fourth or fifth year, with 10 cwt. of rough, crushed rock-salt to the acre, while large

lumps of rock-salt should be scattered over the pastures for the animals to lick. Liming, also, has a good effect on some land; but, from my fifty years' experience, salt is much better, and lands on which, in former years, the disease was intensely rife, have, I am pleased to state, by the application of salt, now been entirely cleared of it. The question is, if the cause of red-water in cattle is the tick, how does it happen that the application of salt to the pastures eradicates the complaint?

#### 472. Swine Fever, Red Soldier, or Blue Sickness.—

This disease is of a highly infectious and contagious typhoid character; it is rapidly spread by contact and cohabitation, and by putting healthy pigs into a box, hull, or place from which diseased animals have been taken, and which have not been properly disinfected. After exposure to infection the malady has a *period of incubation*, varying from five to seven days. The post-mortem reveals that the organs principally affected are the large (cæcum, in particular) and small intestines, and the stomach, the lining membrane of which, at the onset, is congested with small raised red spots seen above the surface. As the disease advances, these spots turn dirty white, and ultimately become ulcers of various sizes, in some cases running one into another—that is, becoming confluent—more particularly round the **ileo-cæcal valve**, where the small intestine joins the large one. As the case progresses, the ulcers change in character, and have a characteristic centre of a dirty grey or dark appearance, surrounded by well-defined yellowish-red rings. In some of the cases there is a deposit of an exudate on the mucous coat of the stomach and bowels of a bran-like appearance, called the diphtheritic form of the disease. The cases, however, differ greatly; some attacks are mild, while others are very severe, in which latter case other organs become implicated, such as the lungs, heart, liver, etc. But the lesions in the alimentary tract are most to be depended upon in the diagnosis of the disease.

*Symptoms.*—The first to be noticed are the listless, languid  
- of the animal and the *extreme pallor and coldness of the skin.*  
r symptom is a very characteristic one, yet it has not been



noticed by many writers. The animal persists in lying, and has no inclination to stand up or walk about; in fact, it is extremely prostrated, even from the very first, and if made to get up, it lies down again immediately, pushing itself under the straw. In from thirty to forty hours after an attack the neck appears slightly swollen, and the skin round it, under the belly and ears, turns red, after which dark blotches make their appearance in different parts of the body, more particularly in the soft portions. These, in many cases, turn purple, and, finally, black. The breathing is quick, and at times laboured, accompanied with a groan or grunt. In some cases both food and water are persistently refused, while in others there is a great thirst, and, as a rule, obstinate constipation, followed by profuse diarrhœa. The patient may struggle on for from eight to twenty, or even more, days, and have all the indications of recovery, when, on some slight disturbance, the animal will die suddenly from failure of the heart's action.

474. *Treatment* is not allowed, as the disease is now scheduled under the Contagious Diseases (Animals) Act. Cases must therefore be reported to the police, and the affected animals destroyed. Prior to the passing of the Act my treatment was, after ordering perfect quietness, to give at the onset to an adult pig from 6 to 10 drops of croton oil on a small teaspoonful of soft sugar, passing it into the inside of the mouth on to the tongue, also warm water injections every six or eight hours, at the same time tempting the animal to drink milk and cold water containing from 1 to 2 drachms of bicarbonate of soda. I had one case many years ago of a fancy-bred sow, which had a very severe attack, and although the blotches on the skin turned black, she recovered. Strange to say, she received altogether above a drachm of croton oil at different times during her illness.

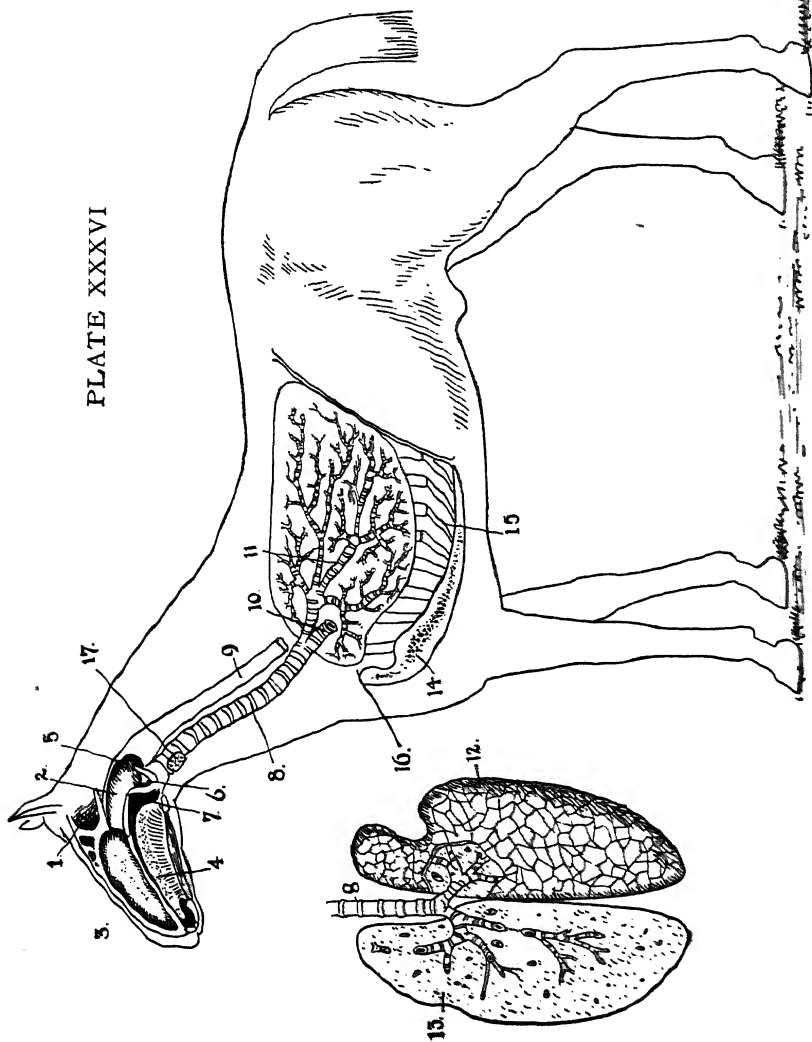
475. **Measles.**—A parasitic disease, recognized by the appearance of dusky red blotches on the body of the pig, and due to the presence of small bladder-worms (*Cysticercus cellulosa*) in the substance of the muscles, which on consumption by human beings, in pork, as they sometimes are, develop into tape-worms; therefore measly

pork is dangerous when eaten by man. Measles is frequently confounded with other complaints affecting pigs, especially cases of indigestion caused by feeding on too much uncooked foods, such as unsound Indian meal, raw potatoes, etc., the symptoms of which are identical with those of measles. These ailments must not be confused with swine fever, as the symptoms are widely different. When these blotches are due to indigestion, there is little or no constitutional disturbance or prostration; the animal will take a little food, seems lively, and runs about as if nothing was amiss. The following *treatment* will answer in both cases—viz., 1 to 2 teaspoonfuls each of bicarbonate of soda and flowers of sulphur given mixed in the morning and evening meal. When the bowels are costive, a dose of croton oil may be administered, as in the preceding paragraph, with injections of warm water three or four times a day.

# PLATE XXXVI

## RESPIRATORY SYSTEM

1. Cranial Cavity.
2. Guttural Pouch.
3. Nasal Cavity.
4. Tongue.
5. Pharyngeal Cavity (Throat).
6. Cavity of Larynx.
7. Epiglottis.
8. Trachea.
9. Oesophagus.
10. Section of Left Bronchus.
11. Ramifications of the Right Bronchus.
12. Right Lung.
13. Left Lung.
14. Sternum (Bread Bone).
15. Ribs.
16. Thymus Gland, Seat of.
17. Thyroid Gland, Seat of.



## LECTURE IX

### THE RESPIRATORY ORGANS

476. **The Nose**, which is divided by a bony and cartilaginous septum (*septum nasi*) into two chambers—the right and left nasal chambers; the **larynx**; the **trachea**, or windpipe; and the **bronchi** and **bronchial tubes**; the **lungs**; the **thorax**, or chest; the **pleuræ**; and the **diaphragm**.

477. **Nasal Chambers** (*Plate XXXVI., No. 3*).—The right and left nasal chambers of the *horse* each contains *two* bones—one above (the *superior*) and one below (the *inferior*). They are made up of very fine sheets of bone, covered with mucous membrane, and rolled up like a Turk's turban, and are called **turbinated bones**. These bones give an extensive surface for the distribution of the nerves concerned in the sense of smell, as well as for the ramification of the bloodvessels which warm the air as it passes over their surface to enter the windpipe. The membrane covering them clears the air from solid particles of dust before it passes to the sinuses of the head or, by way of the windpipe, to the lungs. The *cow* has *three* turbinated bones in each chamber, also a canal (called 'Jacobson's canal') in the floor of the nasal chamber, which communicates with the mouth. The cavities in the horn cores of ruminants are also in communication with the nasal chambers.

478. **Larynx** (*Plate XXXVI., No. 6*) is situated at the back of the throat, and is composed of five pieces of cartilage, or gristle, of different shapes, which are so placed and joined that they are movable on one another, thus regulating the inlet and outlet of the air. These cartilages are named the *thyroid*, *cricoid*, *arytenoid* (2), and *epiglottis*.

They are held together by ligaments, and moved by muscles. The cavity of the larynx is lined by a very sensitive mucous membrane.

479. **Trachea** (*Plate XXXVI., No. 8*), or windpipe, is a long tube running from the larynx to the roots of the lungs, where it divides into two bronchi. It is made up of a number of ring-shaped pieces of cartilage, held together by elastic ligamentous tissue, and is thus capable of flexible movement. It is lined internally with mucous membrane.

480. **Thyroid Gland** (*Plate XXXVI., No. 20*).—This gland is ductless, and consists of two lobes placed one on each side of the trachea, near its junction with the larynx. It is larger in the young than in the adult animal.

481. **Thymus Gland** (*Plate XXXVI., No. 19*) is a single body, found lying on the under side of the trachea at the entrance to the chest. It is large in the very young animal, but gradually disappears after birth. The functions of the thyroid and thymus glands are not, as yet, perfectly understood. Although described in this place, they have nothing to do with respiration.

482. **Bronchi** (*Plate XXXVI., Nos. 10 and 11*) are two in number, one going to the right lung and the other to the left. They divide and subdivide, ramifying through the substance of the lungs, until they are too small to be seen by the naked eye. The smaller branches and the air cells in which they terminate form clusters called lobules. The divisions and subdivisions resemble a tree with branches, the air cells resembling the leaves.

483. **Lungs, or Lights** (*Plate XXXVI., Nos. 12 and 13*)—right and left—are the principal organs of respiration. They are of a fine, soft, spongy texture, pale pink in colour, and very light and porous, owing to the air cells containing air; as a consequence, the lungs can float in water. *In the horse* the right lung is divided into three lobes, and the left lung into two, while *in the cow* the right is divided into four lobes and the left into two. The interlobular tissue is also found in greater abundance in the cow than in the horse. The nutrient

bloodvessels of the lungs are the **bronchial arteries** and **veins**. The *functional* vessels are the **pulmonary arteries** and **veins**, which are much larger than the nutrient vessels. The pulmonary *arteries* convey the blood from the right side of the heart to the lungs to be purified, while the pulmonary *veins* return it to the left side of the heart, as described in the lecture on 'Circulation' (*par.* 407).

484. **Thorax**, or **Chest**, has a part of the back-bone for a roof, the breast-bone, or sternum, for a floor, the ribs and muscles for lateral walls. The **diaphragm** is a strong musculo-membranous partition, which separates the chest from the belly, or abdominal cavity. The inside of the thorax is lined by the *pleura*.

485. **Pleura** is a fine, serous membrane, which lines the inside of the ribs on both sides (*pleura costalis*), and covers the anterior surface of the diaphragm. From the top of the chest and under side of the back-bone, it descends through the middle of the chest to the sternum, dividing the thorax into two lateral halves and forming the *mediastinum*, which encloses and covers the heart. The pleura is also reflected over the outside of the lungs themselves, and is then called the *pleura pulmonalis*.

486. **Respiration**, or breathing, is the act by which a constant interchange of gases takes place between the atmosphere and the blood. Two distinct movements are noticed during respiration—(1) inspiration, and (2) expiration. **Inspiration** is the act by which the lungs become filled with air, for the purpose of purifying the blood, as described in the lecture on 'Circulation' (*par.* 407). **Expiration**, on the other hand, is the act whereby the air in the lungs, charged with carbonic acid gas and other impurities, is expelled from the body. Each inspiration occupies about thrice the length of time taken up by an expiration. The air which passes to and fro during ordinary respiration is called the '*tidal air*'; the '*reserve air*' is that which can be voluntarily ejected after ordinary expiration; '*complemental air*' is that which can be taken in after ordinary inspiration; and '*residual air*' is that which remains after forced expiration. Horses in large towns suffer more from derangement of the respiratory organs than those in the country, and are considerably worse to

treat, owing to want of good fresh air and loose-boxes. Pit horses are similar to town horses: their treatment is quite different from that of those in the country, the doses of medicine being only half the usual quantity, and stimulating remedies succeeding best.

**487. Cubic Air-Space for the Horse.**—The horse is said by some to require 1,200 cubic feet of air-space for healthy respiration. The following extracts from Colonel Fitzwygram's 'Horse and Stables' show the great variation that exists in the cubic space of different stables:

	Cubic Feet per Horse.
Royal Mews .. .. .	2,500
Marlborough House Stables .. .. .	1,700
South-Eastern Railway Company .. .. .	1,540
London General Omnibus Company .. .. .	820
Cab-Horse Stables (average) .. .. .	550
Hyde Park Barracks .. .. .	2,284
Aldershot Cavalry Barracks .. .. .	1,034
Dublin Royal Barracks .. .. .	560
Woolwich (New Model) .. .. .	1,793

**488. Cubic Air-Space for the Cow.**—A great deal has been said and written respecting the cubic air-space requisite for the cow. No one will deny that a good supply of pure air, as well as light, is most essential for the welfare and health of our domestic animals. Yet it is not exactly the 600 or 800 cubic feet of air for each cow that is required so much as proper provision for the exit of the foul air. A 400 cubic feet air-space for each cow, with proper ventilation through the roof by the aid of air-shafts and louvres, will do more for the well-being of the animal than 600 or 800 cubic feet with improper ventilation. All vent-holes in the sides of stables and byres should be discarded, and ventilation by the aid of air-shafts through the roof adopted instead.

## DISEASES OF THE RESPIRATORY ORGANS.

**489.** The respiratory organs, being delicate, are extremely susceptible to derangement and disease in this ever-changing climate of ours, and all sudden chills and changes of temperature, especially

from cold to heat, are very liable to have a baneful effect. Apart from purely atmospheric differences, we sometimes have horses subjected to what I may term artificial changes of temperature, and these are even more prone to be accompanied by injurious results than are the natural changes. For instance, when a young horse is brought in from grass for the first time, put into the stable, and there tied up along with a number of other horses; or it may be it is turned into a small, stuffy loose-box, commonly called a '*hull*,' or, more properly, '*hole*,' where the doors, windows, and ventilators (if there are any) are closed to keep out the cold. All this is done with an utter disregard of the climatic conditions to which the animal has been exposed outside, and consequently the sudden change from the cold clear air to the warm air of the stable (which the breathing of the other horses rapidly contaminates), or to the cooped-up '*hull*' (the atmosphere of which is soon rendered impure by the animal's own breathing), is very apt to produce an attack of congestion of the lungs. Young horses, then, when first brought in, should be placed in a well-ventilated, airy box, say for the first ten days or so, thus making the change more gradual. Again, young green animals, when sold and taken from the country into the town, should at first be put into a separate box or stable, so as to acclimatize them to their new surroundings before they are stabled with other seasoned horses.

490. **Nose.**—Occasionally growths of a cartilaginous or fibrinous nature, also long-necked tumours, or *polypi*, are met with in the nasal chambers, firmly attached to the turbinated bones or the septum of the nose. These growths produce a peculiar snoring sound, and are generally accompanied by a fœtid discharge from the nose, particularly when the bones are implicated. The only treatment of any avail is to cast the horse and remove the obstruction by an operation, which should be performed by a professional man. Some horses are subject to small **warts** covering the tip of the nose, which often become very troublesome, but dressing with acetic acid twice a week will be found to answer well in most of these cases, or smearing them over with treacle every other day.



491. **Broken Nose.**—The bones of the nose may be broken or delved in from some injury, such as a kick from another horse or by the horse itself running away and coming in contact with a stone wall or other obstruction. The loose pieces of bone must be removed, the bleeding stopped by the application of cold water and antiseptics, and the parts dressed as a contused wound.

492. **Hæmorrhage**, or bleeding from the nose, both in the horse and cow, may arise from other causes than injuries, or from growths in the nasal passages. The bleeding may be either from the lining membrane of the nose or from the lungs, and I have on several occasions seen profuse hæmorrhage from the nose of the cow follow difficult parturition. *Treatment.*—Perfect quietness is necessary, with a plentiful application of cold water to the forehead and face, and the nostrils should be plugged with sponge, cotton-wool, etc. Give also  $\frac{1}{2}$ -ounce doses of tincture of iron every four or six hours in 3 gills of cold water, followed with eggs beaten up in milk and water to drink. Hypodermic injections of adrenalin are said to have a wonderful action on these hæmorrhages.

493. The nasal chambers and frontal sinuses of the **sheep** are at times infested by the larvæ of the **gad-fly** (*Estrus ovis*), which resemble the 'warbles' found in the cow's back or the 'bots' in the horse's stomach. At one time it was thought that the larvæ were developed from eggs deposited within the nostrils, but it is now stated that the perfect fly deposits the young live larva within the rim of the nostril, whence, by means of small hooks, it crawls up inside the nose, where it develops. After remaining there for about ten months to mature, it then drops out of the nose on to the ground, and buries itself in the earth for a few weeks, when it emerges in the form of the perfect insect to recommence its life cycle, the usual time for the fly to make its appearance being during the summer months. *Symptoms.*—When the fly attacks the sheep to deposit its larvæ, the sheep hold their noses close to the ground or under the bodies of their companions, and try to get away from their tormentors. When the parasite gains its habitat, it causes sneezing and a discharge from the nose. *Treatment* is of little avail, but injecting a mixture of two parts of turpentine and four of olive oil up the nostrils, or the inhala-

tion of iodine fumes (*par.* 549) may be tried. *Prevention.*—Smear the sheep's nose once a week during the summer months with a mixture of equal parts of Stockholm tar and palm oil.

494. **Catarrh, or Cold.**—A watery discharge from the nose and eyes. The skull contains sinuses, or cavities, which give strength and lightness to the head, and have communication with the atmosphere through the medium of the nostrils. These cavities are subject to irritation and inflammation, and are so affected in cases of common cold, which is of so frequent occurrence in early spring. This may be called simple catarrh or cold in the head. *Symptoms.*—In such cases there may or may not be much constitutional disturbance or rise of temperature, but the animal seems dull and languid, the coat is staring, and watery discharges come from the eyes and nostrils. Immediately these conditions are observed, and the horse is noticed not to take its food freely, it should be knocked off work, put into a nice, dry, airy loose-box, clothed well, have its legs bandaged, and be nursed for a few days. Boiled barley, a little treacle and bran, with a tablespoonful of nitrate of potash, should be given night and morning. Carrots and green food are of great service, and hay-tea should be given to drink. These apparently simple cases are always, however, to be regarded as dangerous, for if neglected, or should the horse get another chill, they may end rather suddenly in congestion of the lungs, followed by death. Again, neglected cases may run on into *nasal gleet*.

495. **Nasal Gleet** is a chronic mattery discharge from one or both nostrils. Now, the discharges from the nostrils are from so many different sources, such as chronic inflammation of the lining membrane, abscesses in the sinuses, diseased teeth, abscesses in, and affections of, the pharynx, larynx, and the lungs, and also from that formidable disease called glanders, that it is of the very greatest importance that in cases with such discharge a professional man be consulted at once to determine the nature of the complaint and to treat accordingly. *Treatment.*—In cases of abscesses in the sinuses or of a diseased molar tooth the parts have to be opened out—for which purpose a tubular saw, termed a *trephine*, is employed—and

the tooth removed or the abscess dressed as the case may be. Simple nasal gleet is at times successfully treated by puffing iodoform up the nostrils with an insufflator or by injecting 15 grains of chinosol dissolved in 1 pint of tepid water up the nostrils.

496. **Glanders** is a highly dangerous, contagious, and inoculable disease, due to the presence of a micro-organism called the *Bacillus mallei*. It is found in the *acute*, *subacute*, and *chronic* forms. In the old coaching days, when stables were badly constructed, with low ceilings and insufficient ventilation, glanders was very rife, and though it is now seldom seen in the country, it is, I am sorry to say, even more prevalent now in towns than formerly. A horse suffering from chronic glanders may go on working and feeding for months before anything particular is noticed about it, except that its coat looks ragged and unhealthy, and the lining membrane of the nostril may be of a peculiar leaden hue. The animal generally has a slight discharge from one nostril, particularly the *left*, and a small enlargement under the left jaw firmly attached to the bone. At first the nasal discharge in glanders resembles healthy pus of a yellow colour, and it has a tendency to stick round the nostrils, but there is no foetid smell accompanying it. As the case proceeds, the discharge is occasionally streaked with blood. On examining the nostril, the *septum nasi* (or division) will be found to be ulcerated, the ulcers having a very peculiar appearance, which needs the eye of the expert practitioner to detect, and as a rule these, when once formed, rarely heal up. The lungs of a glandered horse, on post-mortem, are found to be studded all over (in clusters or separately) with small *nodules*, or tumours—the miliary tubercle. Glanders should be reported immediately it is suspected, as it is very dangerous to both man and beast, and inoculation, from the chronic, will cause the acute form, and death in a very short time.

497. **Farcy** is a disease allied to glanders, and may be considered under the same head. It may be either *acute* or *chronic*. In the former, one (or more) of the limbs swells, with a great amount of constitutional disturbance, accompanied by a rise of temperature. The absorbent vessels, or lymphatics, become distended, like cords,

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and small buds (farcy buds) form at the valves of these vessels, and these generally in due course burst, and discharge a thin purulent fluid. Glanders and farcy are both under the Contagious Diseases (Animals) Act, and being very dangerous diseases, should be reported immediately on being noticed or suspected, and the animal ought to be destroyed at once. Thorough disinfection of the stable is also of the greatest importance, in order to prevent the spread of the disease.

498. In doubtful cases of glanders a preparation called **Mallein** is now frequently injected under the skin on one side of the neck. If the animal is affected with glanders, a painful swelling arises at the seat of the injection, with constitutional disturbances, there being a rise of temperature of  $3^{\circ}$  to  $5^{\circ}$ . If glanders is not present, no reaction takes place. It may be noted that some authorities state that the repeated injection of **mallein** into the body of a glandered horse has a curative action as well as a protective influence, rendering the animal immune from further attacks. The question has not yet been definitely settled, but the law now is that all horses and ponies must be inoculated with mallein before being put down into a coal-mine.

499. **Cough** is a forcible expulsion of inspired air, and may be *acute* or *chronic*, and can only be looked upon as a symptom. It may arise from a variety of causes, such as sore throat, bronchitis, inflammation of the lungs, worms or parasites in the windpipe, disease of the heart, etc., or from foreign bodies in the throat or stomach; and also through reflex action from parasites in the stomach or liver and from irritation of the womb. Now, as all these causes produce distinct and peculiar sounds, it is therefore of the greatest importance to find out the cause before any proper treatment can be recommended or adopted. Neglected simple catarrh may cause a slight cough from irritation of the lining of the throat, in which case a stimulating embrocation, applied round the throat from ear to ear, may give some relief. For preparations for the relief of cough see *par.* 1064, Nos. I. and II., and for further treatment *par.* 494.

500. **Laryngitis**, or **Inflammation of the Larynx**, commonly called sore throat, may result from an injury, neglected catarrh, or a

from the animal being exposed to draughts when heated, from the irritation of dust or smoke from burning buildings, or from chemical fumes. It may or may not be accompanied by any constitutional disturbance. When simple, the application of a mild, stimulating emulsion (see *par. 1066, No. I.*), or of mustard, mixed with cold water to the consistency of thin cream and rubbed round the throat, along with soft food and good nursing, as recommended for catarrh (*par. 1041*), will generally set the matter right in a few days; but if the attack be acute, it may prove very dangerous, and end in the horse becoming a roarer. *Symptoms.*—At the commencement the animal is dull and weary, hanging first on one leg and then on another; the nose is poked out, the coat is on end, the temperature is elevated from  $103^{\circ}$  to  $106^{\circ}$ , the mouth is hot and there is frothing round the lips, the eyelids are partly closed, the visible mucous membranes are congested, the breathing is quickened and accompanied by a noise as the air passes over the inflamed surface, and there is a sore, frightened cough; pain is evinced when the throat is pressed, and there seems great difficulty in swallowing even small quantities of water or other fluid, a portion of these coming back through the nostrils in the act of drinking. *Treatment.*—Immediately the animal is noticed to be thus affected it should be put into a good roomy loose-box, the body well clothed, the legs bandaged, and a mild cantharides liniment applied to the throat (*par. 1066, No. II.*). I have, for years, tried all kinds of methods of applying a poultice, but never could fix one to my satisfaction. Its weight distresses the animal, and there is great difficulty in getting it to keep close enough to the throat. The best plan to do any good is to apply a smart stimulant.

501. In all throat affections it is dangerous to give draughts; yet, if 8 to 10 ounces of linseed oil, with 1 to  $1\frac{1}{2}$  ounces of spirits of nitre, can be administered at the start, good effects may result; but if there is any difficulty in swallowing, do not attempt to drench the animal. Steaming the nostrils, by putting a dessert-spoonful of carbolic acid, turpentine, or *eucalyptus* oil (the latter for preference) on a sop of hay in the bottom of a pail, pouring boiling water on it, and holding the

animal's head over the vessel for twenty minutes, doing it three or four times a day, has an excellent and soothing effect. The nostrils at the same time should be washed with Sanitas or vinegar and warm water. The inhalation and washing above noted are also to be highly recommended in cases of catarrh and bronchitis. (*For this purpose, never put the head into a nose-bag.*) Nitrate or chlorate of potash, in 2 to 3 drachm doses, given in bran mashes, or in cold water night and morning, with linseed jelly and milk or hay-tea to drink, can be recommended. Electuaries, composed of extract of belladonna, powdered chlorate of potash, and honey are sometimes used. A small piece of this is put into the horse's mouth three or four times a day, but I do not subscribe to this treatment, as it retards recovery and prevents the patient feeding. Should the case assume a serious aspect, by the internal parts becoming congested and swollen, with danger of suffocation, and the animal makes a roaring noise, then tracheotomy must be performed. This is done by cutting into the windpipe, and inserting a tube through which the animal can breathe, independently of the nostrils (*Plate LIV., No. 7*). The operation is easily performed, and should not be delayed too long, as, when the horse is much oppressed in getting breath, some of the fluid which it attempts to drink may pass down into the lungs and produce congestion, while, when the tube is in, any fluid which may trickle down the windpipe comes out at the tube. I have frequently seen this. In all cases of throat affections, strange as it may seem, the horse is much fonder of dry than of soft food or fluids. Should the bowels be very costive, they can be regulated by giving, night and morning, from  $1\frac{1}{2}$  to 2 ounces of Epsom salts in a mash, with a little treacle. A good-sized piece of lump rock-salt should be placed in the manger for the patient to lick, and also a good bunch of gorse (whins) hung up in the box for the horse to pick.

502. **Strangles** is a febrile suppurative disease, most commonly seen in young horses, particularly at the age of two to three years, of an infectious nature, and technically called *febra pyogenica*. It may be of a *simple* or *complicated* nature. In the latter case it is termed

**Simple, or bastard strangles** The name 'strangles,' no doubt, originates from the strangling or choking sensation, which must be caused by the abscesses formed under the jaw, round the throat, and beneath the ears. It is mostly seen during the spring months, or when young horses are newly brought in from grass and in the midst of their dentition. The simple form may pass off very mildly, without much disturbance, the small abscesses coming to a head and bursting, with no bad results following. Good nursing and ventilation are all that is necessary, and these are very essential in every case. Soft mashes, green food, carrots or potatoes, may also be given with great advantage. If necessary, a small dose of linseed oil—10 to 15 ounces—may be administered, or 1-ounce doses of Epsom salts can be given in a mash or in drinking-water every six hours until the bowels respond, and nitrate water should be offered to drink. As a preventive hypodermic injections of anti-streptococcus serum are recommended.

5-3. **Bastard Strangles** is the complicated form of strangles, or when abscesses develop in an irregular manner, bursting and forming again in different parts of the body, such as under the jaw, under the ears, or on the side of the face. Such cases require skilled attention, as they may result in **pyæmia**. The horse in this state becomes feverish, the temperature rises to  $105^{\circ}$  and  $106^{\circ}$ , and the pulse is quick and small; there is no appetite; the coat stands on end, and in some cases the legs swell, and the abscesses under the ears become so large that the animal is threatened with suffocation, and tracheotomy has to be performed. The bowels in such cases must be regulated with mashes or green food. Purgatives must be avoided, but, if necessary, 1 or 2 ounces of sulphate of soda in a mash, in the drinking-water, or hay-tea, may be given twice a day, while a good stimulating liniment should be applied to the throat (*par.* 1066, No. 1.); at the same time the nose should be steamed (*par.* 501). Chlorate of potash, in 2-drachm doses, given in the drinking-water along with 20-drop doses of strong hydrochloric acid twice a day, also answers well; or 1-drachm doses of sulphate of quinine may be given, night and morning, with 10 drops sulphuric

acid, in 1 pint of cold water. Hypodermic injections of nuclein can also be given with advantage, whilst the injections of prepared serums is thought to have a preventive influence.

504. Young colts should never be castrated when cases of strangles are prevalent, as the result of the operation may prove troublesome; for abscesses may form in the groin and neighbouring parts. Strangles frequently terminates in *roaring*.

505. **Roaring** is a peculiar noise made by the horse during the act of inspiration when put to heavy or fast work. It may arise from obstruction of various kinds in the air-passages, but is very often traceable to a hereditary tendency. Injuries to the throat by foreign bodies, setting up irritation and inflammation of the pharynx and larynx; tight reining of carriage horses, as with bearing-reins; severe colds, etc., are all liable to produce the disease, while long peacock-necked horses are more prone to it than short-necked ones. The complaint is mainly due to the muscles, particularly on the left side of the larynx, becoming wasted away—*atrophied*—losing their bright red colour, and assuming the appearance of yellow strings, so that they are unable to do their work of expanding the cartilages during the act of breathing. Thus the left side remains stationary, and the vocal cord inside the larynx hangs loose and limp, so that on inspiration more air rushes into the passage than can be conveniently accommodated; and if the breathing be in any way hurried from exercise, this air, forcing itself through the half-opened passage, produces the roaring noise.

506. The wasting of the muscles above referred to is considered to be due to loss of nerve-power. The nerve supplying them is the *inferior laryngeal*, a branch of the *pneumogastric*. The nerves on the two sides of the neck and chest are known as the *right* and *left recurrent laryngeals*. The latter passes down into the chest, winds round the aorta, just above the heart, then proceeds up the neck with the carotid artery to supply the muscles of the left side of the larynx. It has a much longer course than the right nerve, and it is generally considered to be more liable to derangement. Thus it is



thought that the outside of the larynx is more especially affected in roaring. But this as it may, mares and ponies are rarely so much affected as the heavier stallions and geldings. Various operations have been tried for its cure, the latest being the cutting into the larynx through the cricothyroidean ligament, and stripping the lining mucous membrane from the inside of the larynx, when the cartilages become united. Good accounts are given of this operation, which is now being performed by several specialists, but, so far, nothing is better than tracheotomy. By this a horse can be made serviceable for years, either for fast or slow work.

307. In an examination for soundness, it is a matter of vast importance to carefully test the wind. In a strong horse particularly it is usual to put the animal against the wall and feign to strike it. If the subject be a roarer, it will in the majority of cases give a long groan; but if a sharp grunt be emitted, the probability is that the horse is only a nervous grunter. Nevertheless, the animal may make no sound whatever, and yet be a confirmed roarer, and therefore I consider this a very imperfect test. The best plan is either to gallop the horse some distance, or to make it pull a heavy load uphill. These trials will soon prove whether the animal is a roarer or not.

308. **Whistlers and High-blowers** are modified forms of roarers, and should always be regarded with suspicion. The causes are generally similar to those which produce roaring.

309. **Bronchocele or Goitre.**—This is an enlargement of the thyroid gland (*Plate XXXVI., No. 20*), by no means common in domestic animals, but of frequent occurrence in human beings, especially those living in limestone districts, near high mountains—*e.g.*, the Alps and Himalayas. Iodine preparations I have found to have the best effect, such as 2-drachm doses of iodide of potassium given once a day in a mash for ten days or so, and iodide ointment applied to the enlargement once every third day (*par. 1066, No. III.*).

310. **Bronchitis**, or inflammation of the lining membrane of the bronchial tubes in the lungs, arising from causes similar to those

named under laryngitis (*par.* 500), may either be *acute* or *chronic*, and affect one or both lungs, while either the large or small branches of the bronchial tubes may be attacked separately or in conjunction. It is a very serious complaint, for if from the inflammatory process some of the bronchial passages, particularly the larger branches, become blocked up, the blood cannot get properly oxygenated, and impure blood is therefore sent through the system, acts on the nerve centres, and causes great debility very early on in the complaint. *Symptoms*.—As a rule, the horse will not lie down in chest affections. In acute attacks of bronchitis it will, in many cases, at an early stage be found leaning against the stall for support. Again, on account of the circulation of impure blood, oxidation of the tissues cannot go on, and coldness of the extremities and of the surface of the body is the result. In health there is a certain amount of moisture always present in the mucous lining, but in the early stages of this complaint, on applying the ear to the windpipe at the lower part of the neck, a dry, crisp sound is heard in the bronchial tubes. However, as the case advances this gives way to a loose slobbery noise, while the cough, which is at first dry, hard, and sore, becomes similarly changed to a soft and loosened one. Great care must be taken at this later stage, as the inflammatory mucous material, on being thrown off, makes its way up the windpipe to be coughed up and discharged by the nose. The causes of bronchitis are similar to those of ordinary colds, and are various, such as chills, removing from cold to hot stables, or any sudden changes of temperature, east winds, smoke, chemical fumes, parasites or foreign bodies in the bronchial tubes, etc. In the cow, during the early spring months, when east winds are prevalent, it is a very common accompaniment to retention of the second cleansing, when the flow of the debris from the womb has been checked. It may also be caused by moving the animal too early after calving.

511. Generally speaking, all derangements and diseases, more especially of the respiratory organs, are ushered in by a shivering fit. If this be noticed, the animal should be well clothed up, and a good stimulant, such as  $\frac{1}{2}$  pint of whisky in as much water, or from

1 to 2 ounces each of aromatic spirit of ammonia and spirits of nitre, or 3 ounces each of ammonia and 1 ounce of spirits of nitre, may be administered in 1 pint of cold water (*par. 1067, No. 1*). A dose of nuxvom given hypodermically answers well here, if given at the commencement. As a rule, however, the first thing to be noticed is that the animal is very dull and languid, with the hair standing on end. The inside of the eyelids is red, the mouth is hot, the head droops, the breathing is more or less accelerated, and there is a soft, weak pulse and an elevation of temperature from about  $103^{\circ}$  to  $106^{\circ}$ . *Treatment.* The animal should be put into a good, dry, well-ventilated loose box, free from draughts, woollen bandages put on the legs, also warm sheets on the body, and a pailful of cold water containing a tablespoonful of nitrate of potash placed in the box for the patient to drink.

§12. It is very dangerous to use purgatives in these cases, as great debility soon sets in, and the aperient, however slight—even 8 ounces of linseed oil—may set up superpurgation, which tends to remove the inflammation from the bronchial tubes to the lining membranes of the intestines, causing in many cases muco-enteritis and death. Or perhaps from the continued purging the inflammation may again be shifted to the feet, producing laminitis, or founder. *This shows how very necessary it is to know what the chest affection really is before attempting to treat it in any way.* In all chest diseases there is great danger in giving drenches, as some of the fluid might get into the trachea or bronchial tubes, causing great distress; so, if a drench has to be administered, it must be done with great caution. Half-ounce doses of carbonate of ammonia in a ball, or in the drinking-water, every six or eight hours may, however, be given with advantage, and if the cough be troublesome, 1 ounce of chlorodyne mixed with 1 ounce of glycerine can be given three times a day in mashes of bran or boiled barley containing a little treacle or sugar, or in hay-tea nearly cold. Many practitioners recommend that blankets which have been wrung out of hot water be applied to the chest with a waterproof rug above. In some cases this answers well, in others it has a very oppressive and relaxing effect, and should not be

carried too far. I am more in favour of slightly stimulating both sides of the chest behind the shoulder with 2 tablespoonfuls of mustard well mixed in 1 pint of cold water, after which a piece of flannel, cotton-wool, or wadding should be put round the body and warm woollen clothing put over all. I also strongly advocate the steaming of the nose and air-passages as recommended under Laryngitis (*par.* 501). Food of an easily digestible nature must be given, such as boiled barley and bran, milk and water, linseed jelly, carrots, potatoes, green food, *chopped whins (gorse)*, etc. It is also a good practice to feed patients (discharging from the nose) from buckets or troughs as near to the ground as possible, so as to give an easy means of exit to the discharge.

**513. Congestion of the Lungs.**—An overloading or stagnation of blood in the small bloodvessels of the lungs. This is a very common termination of many diseases, and is, in some cases, very easily produced. For example, when an animal is suffering from a slight cold, with relaxed system, a sudden chill will induce congestion of the lungs, and kill the animal in a few hours. On account of its running its course so rapidly in many cases, there is little time to combat the trouble. It is often, in fact, worse to handle than *inflammation of the lungs*. *The difference between congestion and inflammation is*, that in the former the blood stagnates in the tissues of the lungs like water in a sponge, but there is no visible structural change of the part; for want of tone the blood accumulates, giving the lungs a deep brownish-black appearance. Yet, when they are put into water they do not sink to the bottom, but, being loaded with blood, sink just below the surface—waterlogged, as it were. Inflammation, on the other hand, changes the structure. The lungs become solid similar in appearance to the liver, and, when put into water, sink to the bottom like lead, the air cells being completely blocked up by inflammatory products, whereas in congestion they are merely pressed by the congested vessels. Congestion is at times readily induced (especially in a badly conditioned horse) by a heavy, fast run with hounds, when the animal has been galloped to a standstill. When the animal is thus affected, the head is extended, the nostrils

dilated; the breathing is short, quick, and panting; the legs are spread wide apart, and the muscles of the body and limbs are all in a quiver. The rider having dismounted, the girths should be slackened, and the horse's head turned to the wind; then, after it has settled down a little, the contents of the horseman's flask, or that of his companions, can be given, with an equal quantity of water. The patient should next be carefully led to the nearest box, when 4 drachms carbonate of ammonia made into a ball, with a little linseed meal and water, may be given at once, and the body sheeted and legs bandaged, as detailed in *par. 511*. A dose of nuclein may also be given hypodermically.

514. In acute congestion, if early on the scene, I know of no better or quicker relief than that obtained by taking 3 or 4 quarts of blood from the jugular vein. This takes off the pressure, allows freedom to the right side of the heart, and gives the *functional* vessels a little liberty to relieve themselves. If this be followed up by the administration of stimulants—and nothing is better than the carbonate of ammonia ball named in *par. 513*, given every four or six hours—the result will generally be favourable. The after-treatment should be much the same as that recommended under Bronchitis, *par. 511*. Any of the foregoing complaints may end in *pneumonia*, or inflammation of the lungs.

515. **Pneumonia** (Inflammation of, and Structural Change of, One or Both Lungs).—The air cells become blocked up, and consolidation of the lungs takes place, in which either a portion of a lung, or one lung, or both, may be involved. Pneumonia, arising as it does from a variety of causes (see Laryngitis, *par. 500*), and passing through many stages, requires careful treatment, and should be placed in the hands of a skilled practitioner without delay. When it is certain that the disease really is true pneumonia, then more heroic treatment may be adopted than that used for bronchitis. *Treatment*.—At the early part of the attack, when the animal's breathing is hurried, the nostrils dilated, the under side of the eyelids red, and the pulse full and oppressed, with a temperature ranging from 105° to 106°, the extraction of 5 or 6 quarts of blood has a wonderfully good

effect—at least, such is the case in country practice—and gives prompt relief. This may be accompanied by a dose of from 10 to 20 ounces of linseed oil, mixed with 1 to 2 ounces of spirits of nitre, and 10 to 15 drops of tincture of aconite (Fleming's). A dose of nuclein given hypodermically answers well in many cases if given at the onset. Blankets wrung out of hot water, as described under Bronchitis, may be applied to the chest, and nitrate of potash offered in the drinking-water with soft food, as also recommended for Bronchitis. Good nursing all through is highly essential. Associated with this disease we may have **pleuro-pneumonia**, as in cattle, in which both the lungs and their covering (the pleuræ) are involved, and the treatment is the same as in pneumonia.

516. **Pleurisy** consists in inflammation of the pleuræ—that is, the serous membrane which lines the chest and covers the lungs (*par.* 485). This is a very painful complaint; the animal stands still, appears to be frightened to move, the elbows are turned out, and the ribs are as stationary as possible. The breathing, which is very hurried, is for the most part carried on by the abdominal muscles, thus causing a ridge or line—the pleuritic line—from the elbow-point to the haunch-bone. If made to move, the animal groans with pain; the eyelids are red, the nose is poked out, and the pulse is full and strong. At times a painful *frightened* cough is emitted. When both surfaces of the pleuræ are involved in the inflammatory action, bands of fibrin are formed between the lungs and the walls of the chest. This formation will take place in the space of from thirty to forty hours, and as the case proceeds the chest becomes full of water on one or both sides, producing the condition known as *hydrothorax*. At first the *treatment* to be adopted is similar to that given under *Pneumonia* (*par.* 515).

517. **Hydrothorax**, or water in the chest, sometimes arises from attacks of **bronchitis, pneumonia, heart disease, and pleurisy**. The symptoms are somewhat analogous to those observed in *pleurisy*, but on applying the ear to the lower portion of the neck, just above the breast-bone, the water can generally be distinctly heard splashing

in the chest. The animal is much oppressed, and stands with the elbows pointing outwards, and at times the limbs are swollen. *Treatment*.—Relief is best obtained by tapping the chest with a trocar and cannula (*Plate LIV., No. 5*), and drawing off the fluid—but this should only be attempted by a qualified practitioner—following up the operation by the administration of iodide and iron tonics (*par. 1073, No. III.*), combined with suitable diuretics, good nutritious food, and plenty of fresh air.

518. In all acute cases of chest affections, on account of the horse's breast-bone being set vertically, the animal will not lie down for fear of suffocation, so that as the case progresses lying down is a good sign of convalescence. Cattle, on the other hand, having a flat sternum or breast-bone, and joints at the lower end of the ribs as well, can lie down throughout the whole attack.

519. **Asthma, or Broken Wind** (Difficult Breathing, or Dyspnœa).—This is by no means so common as it used to be. It may be said *to exist in two forms*. The first of these consists of spasms, or a rigid contraction of the bronchial muscles, induced by the inhalation of certain matters, such as new-made hay (producing hay asthma or hay fever), and may be due to the pollen of some of the grass plants loaded with some small insect pests being inhaled and irritating the throat and bronchial tubes. This form is oftener seen in cattle than in horses, more particularly after hay-time, when the animal is put on to the fog or aftermath. There is great difficulty in the breathing, which is of a tight spasmodic character, and it is accompanied by a wheezing, squeaking sound. The eyes are staring and the nostrils distended. The animal will take no food during the attack, which may last from four to twenty-four hours. For this form of the complaint great relief is obtained by putting the animal into a roomy loose-box, or, better still, outside on an old grassing if the weather is fine, and giving such remedies as camphor, digitalis, chloral hydrate, belladonna (*par. 1064, No. II.*), or by causing it to *inhale the fumes of eucalyptus oil or terebene* (*par. 507*).

520. The second form is of much more importance, and is due to structural change in the lungs; some of the small air cells having become ruptured, the air finds its way through the tissue of the lungs to beneath the pleura, and gives the surface of the lungs a blubbery appearance, called **emphysema**. This form of the malady is at times due to a bad attack of influenza, bronchitis, or pneumonia, but more frequently it is caused by bad food—particularly musty hay and corn—or by putting the animal to too hard an exertion, such as starting off full trot immediately after feeding. Such causes act not only mechanically, but also on the gastric branches of the pneumogastric nerve, which, by reflex action, implicate the lung or chest branches. As this form of complaint is incurable, the great point is to get the animal to work comfortably, and for this purpose the feeding must be regulated; nutritious diet of not too bulky a character ought to be given, and plenty of fresh air allowed. A case of this kind does best out of doors. The affected animal always has a peculiar way of breathing. The inspiration is performed with comparative ease, but the expiratory effort is double, the flank falling with a jerky motion. The cough is also noticeable, being a long, dry, droning bark, which is characteristic of the disease. On applying the ear to the lower part of the windpipe, a crackling, hissing sound is also to be heard in the lungs. *Treatment* is of little avail, but a cough ball may be given every night for a week (*par. 1064, No. II.*); but from 2 or 3 grain doses of arsenic once a day for ten days or a fortnight given in a mash answers best.

521. Formerly, unprincipled dealers used to practise all sorts of tricks in selling an animal thus affected, such as pouring 1 or 2 pounds of lead shot, with a pound of melted butter, down the horse's throat. This weighed the stomach down, taking the pressure off the diaphragm, and thus allowed the lungs more play, when the horse breathed almost naturally. Another practice was to cut a hole into the abdominal cavity close to the rectum, when the air, being allowed access, rushed in, and had the effect of assisting the breathing, and this also seemed to have a controlling action on the double breathing. I have seen a few cases of this trick in the early part of my professional career, but they are rare nowadays.



522. **Influenza** is a fever of a specific character, varying very much in degree according to the nature of the attack and the condition of the patient, of an epizootic type, and may be regarded as a morbid condition of the blood. Some cases are very slight, while others are of a more virulent type, being accompanied by great prostration and general debility. Influenza in the horse has an incubative stage of about four or five days, and the duration of an attack varies from ten days to even twenty days. It is of a very infectious nature, and usually follows in the wake of traders in horses, all classes of horses being subject to its influence. It makes itself manifest in four different forms, such as—(1) **simple catarrhal fever**; (2) **catarrh, with chest complications**; (3) **catarrh, with bilious fever**; and (4) **oedematous or exudative cellulitis**, recognizable by the swollen limbs or eyelids.

523. **Simple Catarrhal Fever** resembles very much simple catarrh, or common cold (*par.* 494). The symptoms are somewhat analogous, and similar treatment can be adopted.

524. **Catarrh, with Chest Complications**, is of a more critical character, as the lungs, bronchial tubes, pleura, and the heart coverings become implicated. The breathing is very much quickened, and the temperature runs up to 106° and 107° F., while the eyes and nose discharge quantities of matter. The symptoms are somewhat similar to those seen in bronchitis (*par.* 510), and the *treatment* should be as stated in *pars.* 511 and 512.

525. **Catarrh and Bilious Fever**.—In these cases the distinguishing difference in the symptoms is the yellowness of the under side of the eyelids and the lining membrane of the nose and mouth. The attack may come on suddenly, with slight symptoms of colic, or it may crawl on insidiously for two or three days before making itself manifest, when the animal becomes very dejected and weak. The *treatment* is similar to that noted for the two former cases, with the addition of small doses of calomel, which I find to answer well when given in  $\frac{1}{2}$ -drachm doses in a little mash, or in a ball every eight hours until three doses are administered.

526. **Œdematous or Exudative Cellulitis**, commonly called **pink-eye**, is recognizable by the legs and eyelids becoming swollen. The lining membrane of the eyelid, nose, and mouth are in such a state of a pink colour. Pink-eye is of a very variable character; at times it is so slight that scarcely anything amiss can be noticed—the eyelids are puffed up, with a watery discharge coming from the inner corner of the eye, and one or more of the legs may be slightly swollen about the joints and shanks; at other times the eyes, face, muzzle are much enlarged, and the legs very much distended. The animal refuses its food, can scarcely stir, is very languid and much depressed, breathing becomes quick, and the temperature rises up to 106° F. *Treatment*.—Hyposulphite of soda may be given at night and morning in 2-ounce doses, with 1 to 2 drachm doses of tincture of quinine every eight hours. In some cases chlorate of potassium and iron tonics answer well. Further treatment and feeding should be as noted in *par. 512*. Nuclein can also be given hypodermically in any one of these cases with great advantage. As a preventive of influenza and its complications, hypodermic injections of anti-streptococcus serum are recommended.

527. Seeing that all cases of affections of the respiratory organs are somewhat analogous at the commencement, they should be placed under the care of a professional expert without delay, and not tampered with by giving quack medicines.

### PIG.

528. This animal, although subjected to the worst forms of sanitary conditions, rarely suffers from derangement of the respiratory organs. Cases of laryngitis are sometimes met with, also bronchitis and inflammation of the lungs. The conditions of nursing and treatment as named for the dog (*par. 529*) can be followed, but the doses of medicine there noted must be doubled.

### DOG.

529. Like all other animals, the dog suffers from derangement of the respiratory organs, such as laryngitis, bronchitis,

congestion of the lungs, pneumonia, pleurisy, hydrothorax, and asthma. When the animal is seen ailing, it should at once be put into a warm, dry, well-ventilated room or kennel, with the bed well raised from the floor, which should be covered with sawdust or moss-litter. Should the weather be cold and raw, an oil-stove (well guarded) put into the kennel will be found very serviceable, keeping the room or kennel at a proper temperature. A mild dose of opening medicine should first be administered, such as 2 to 8 drachms each of castor oil and syrup of buckthorn, according to the size of the animal. When necessary, apply to each side of the chest, behind the shoulders, some stimulative embrocation (*par. 1066, No. I.*), over which apply a good layer of absorbent cotton-wool, and retain it in its place with a bandage round the body; or a piece of flannel three or four ply thick, wrung out of hot water, may be rolled round the body behind the shoulder, covered with a waterproof cover, and secured with a bandage. The following medicine can also be administered—*i.e.*, from 1 to 4 drachms of liquor ammonia acetatis, along with 20 to 60 drops of spirits of nitre, given every eight or ten hours in 1 wineglassful of cold water or linseed tea. When a cough is present and troublesome, the cough mixture for dogs (*par. 1064, No. III.*) can be used twice daily, supplemented when necessary by one of the aperient dog-pills noted in *par. 320*.

530. After the active symptoms have abated, then tonics may be serviceable. One teaspoonful each of Parrish's syrup and glycerine given in water twice a day answers well, or 2 to 6 grains of sulphate of quinine in a wineglassful of port wine may be administered. The food to be given must be of an easily digestible nature, such as beef-tea, mutton or chicken broth, and milk and bread.

531. **Asthma**, or difficult breathing (*pars. 519 and 529*), is mostly seen in aged, overfed, pampered dogs. It is generally due to improper feeding, and is usually associated with liver complications. For symptoms, treatment, and feeding, see *par. 320*.

532. **Distemper** is a contagious, febrile disease of a specific character, due to a septic organism, and although it may attack

dogs at all ages, it is mostly seen in puppies, and, like measles in the human subject, generally occurs only once in a lifetime. Some breeds of dogs suffer more from the malady than others. It attacks various parts of the body, such as the respiratory organs, those of digestion or the nervous system, also in a complicated form.

533. The organs of respiration are, however, the most subject to an attack of the malady, and when the puppy is observed to be dull, languid, depressed, and off its food, with a dry muzzle and a discharge from the eyes and nose, it may be assumed that it is 'breeding' distemper. It is highly necessary that the patient be well cared for at the outset, and at once put into comfortable quarters (*par.* 529), and have administered a dose of castor oil and syrup of buckthorn. This should be followed up every eight hours with a dose of from 10 to 60 grains of hyposulphite of soda dissolved in 1 wineglassful of cold water, to which from 1 to 6 grains of sulphate of quinine has been added. The hyposulphite and quinine mixture I have found to answer splendidly. For further treatment and feeding, *see pars.* 529 and 530. Hypodermic injections of specially prepared anti-streptococcus serum are useful as a preventive.

534. Bad attacks of distemper in dogs occasionally end in **Chorea** (*par.* 598). This is a derangement of the nervous system, for which there is nothing better than Easton's syrup or Fellows' compound syrup of hypophosphites, and of this from 1 to 2 teaspoonfuls in water may be given twice a day.

## CATTLE.

535. Affections of the respiratory organs in cattle are not of such common occurrence as with the horse. Colds, chills, changes of temperature, east winds, etc., as a rule affect the digestive organs of cattle more than those of the respiratory system.

536. **Acute Catarrh** is a watery discharge from the eyes and nose, accompanied by general fever, and is occasionally met with, particularly in Irish cattle that have been brought across the water

in the early spring months. The complaint is of a febrile character, and of a low type, while it is generally accompanied by exhaustive diarrhoea. The patient stops feeding and chewing the cud, the nose is dry, there are excessive watery discharges from the eyes and nose, and great languor and depression present. As the case proceeds the eyes become red and gummy, and the secretion crusts around the nostrils. The animal lies constantly, and will scarcely get up, the case finally assuming a typhoid character. Good nursing is eminently necessary. Clothe the body well, and make the patient as comfortable as possible. Give to drink linseed jelly and milk, or hay or nettle tea, or gruel, and administer three times a day either 1 drachm of sulphate of quinine and 10 drops strong sulphuric acid in 1 pint of cold water, or 3 drachms of chlorate of potash, with 25 drops of strong hydrochloric acid in cold water night and morning, with occasional  $\frac{1}{2}$ -pint doses of linseed oil when necessary. Aromatics, such as ginger, aniseeds, etc., given in treacle gruel occasionally, will also be found to act beneficially. Steaming and washing the nostrils, as recommended in *par. 501*, are of great service.

**537. Bronchitis, Congestion of the Lungs, Pneumonia and Pleurisy,** arise in the cow from somewhat similar causes as they do in the horse, and, again, require somewhat similar treatment (*pars. from 510 to 516*).

**538. Bronchitis and Pneumonia** I frequently meet with in the cow following parturition, more particularly in the early spring months. These in many cases have a septic tendency. *Parturient bronchitis* in the cow is usually of a subacute nature; the animal drops off feeding and chewing the cud, secretion of milk is nearly suspended, the flesh falls off very quickly, the animal has a languid appearance, and there is a painful, sore cough, yet the breathing is not much disturbed. While the *parturient pneumonia* is of a more acute character, the symptoms are somewhat similar, only the cough is not so frequent or so painful, and on applying the ear to the side of the chest the lungs are heard to have a peculiar jerky, squeaky

sound, while the breathing is also much quicker and abdominal. The following *treatment* answers well in both cases: Put the animal into a good loose-box, and apply mustard and water, mixed to the thickness of cream, behind the shoulders for about 16 inches broad (extending from the spine down to the breast-bone), and over this place a piece of newspaper, covering with a sheet and girth. Also give 5-ounce doses of linseed oil and 1 ounce of spirits of nitre twice a day, following this up every eight hours with a dose of  $\frac{1}{2}$  drachm of carbolic acid (B.P.) and  $\frac{1}{2}$  ounce glycerine in milk or water, tempting the appetite with anything that the animal will eat, and giving it good nursing. Nuclein injections hypodermically are highly useful here.

**539. Pleuro-Pneumonia** (a Combined Inflammation of the Lungs and Pleuræ).—There are two kinds of pleuro-pneumonia—the *simple* and the *contagious*. On account of the structural arrangements of the lungs of the cow, I have seen post-mortem appearances exhibited in the lungs—resembling those of pleuro-pneumonia (contagious), but which I have traced to a needle or wire, passing in its course from the stomach to the heart through these organs, and I have had numbers of cases—single solitary cases—of simple pneumonia which showed the characteristic marbled post-mortem appearances of contagious pleuro-pneumonia, but the lungs were of a more purply hue and more gritty.

**540. Simple Pleuro-Pneumonia** (Simple Inflammation of the Lungs and Pleura).—The symptoms are analogous to those of the contagious form (*par.* 541), but are of a more acute nature, and the cases are *solitary*—*i.e.*, there is not a general outbreak of the malady. The treatment recommended for the simple form is to give in water every eight hours 10 drops of Fleming's tincture of aconite, and 3 drachms of potass nitrate, or 1 ounce sweet spirits of nitre, also when required  $\frac{1}{2}$  pint of linseed oil every night, and to apply the mustard mixture to the sides as recommended in *par.* 538.

**541. Contagious Pleuro-Pneumonia** is a specific inflammation of the lungs and pleura of a highly-infectious character, somewhat resembling specific erysipelas in the human subject. It may

be *acute*, *subacute*, or *chronic*, and part of one, or perhaps both, lungs may be affected. In some cases the animal shows no symptoms of illness, feeding, chewing the cud, and milking; and the great rise of temperature may be the first thing to attract attention to the chest, where the sounds peculiar to this disease are heard. Primarily, there are crepitating murmurs, next a squeaky, jerky friction or rubbing sound; finally the lung solidifies, and no sound is to be heard over that area. On striking or tapping the chest over this part there is a dull, solid response. In an acute case the animal drops off feeding, stops chewing the cud and giving milk, stands stiff and thoughtful, with nose poked out, sides dropped in and flat. The breathing is fast and entirely done by the abdominal muscles, there is a short, dry, characteristic cough, and the temperature generally ranges from  $104^{\circ}$  to  $106^{\circ}$ . Auscultation, or listening to the sounds in the chest, with the history of the case, assists the professional practitioner in arriving at a diagnosis. As the disease has now been stamped out under the Contagious Diseases (Animals) Act, no treatment is allowed. Inoculation is, however, carried on in some countries with great success, and I have myself seen it tried with the best results. Post-mortem shows the lungs to be of a variegated red and white, or purple and white, solid marble appearance, according to the stage of the disease.

542. **Tuberculosis, Consumption, or Scrofula**, a disease due to the presence of micro-organisms—the tubercle bacilli. All the parts of the body are more or less subject to its baneful influence; and although the muscular tissue is seldom the seat of the disease, yet in generalized tuberculosis the glands situated in their midst may be so. The lungs, however, seem to be the organs most affected. Tuberculosis attacking the lungs of the cow may be *acute* or *chronic*. In the former I have seen the lungs and inside of the walls of the chest studded all over with small tubercular nodules, either grouped together or continuous. The animal may possibly have been doing well up to the time it was noticed to be severely ill—in fact, it may be quite fat. These cases on their commencement exhibit all the symptoms of acute pneumonia,

and it is only through the post-mortem examination that the true state of affairs is found.

543. In a chronic case an animal may go on feeding, thriving, and doing well, and nothing may be observed until it is slaughtered, when masses of tubercular matter are found studded throughout the lungs, liver, and mesentery, some in a fluid condition, others semi-fluid or solid, and enclosed in a capsule, while others are of a cheesy consistency or of a calcareous nature. An animal affected like this, when the disease is distinctly localized, I think, might be used for human food; but when it shows the symptoms of tuberculosis during life by falling off in flesh, though feeding and milking, having a bad cough, being also hide-bound, and with a yellow, scruffy skin—in fact, having all the symptoms of a ‘piner’—the sooner it is either buried or cremated the better.

544. Tuberculosis is due to the *tubercle bacilli*, and is said to be *infectious by inhalation, ingestion, and inoculation*. It may be so where animals have a hereditary tendency and have cohabited for some length of time with others thoroughly diseased. Looking backwards for a number of years, I can call to mind one particular bull whose stock—sons, grandsons, and great-grandsons, etc.—have introduced the disease amongst herds where formerly it was never known. Even up to the present day I can put my finger on some of this bull’s diseased descendants. This is not an isolated case, for within my own experience I could give many similar illustrations. Strange to say, the malady, in the majority of cases, does not make itself manifest until the animals are coming to puberty (two years old). The same seems to hold good in the human subject. When there are two closely related families, having one mother but two different fathers, or *vice versa* (the first husband being consumptive, the second being strong and healthy), the children by the consumptive father generally shows signs of the fell disease on their reaching the age of puberty, while the family by the healthy father are hearty and well, without the least symptom of the malady, yet all the time they have been living and sleeping under the same roof and feeding



at the same table. I am stating my own family experience. Again, calves newly-born have been found to be tubercular. Where did they get the disease from? With these facts before me, I am inclined to think that the disease is spread as much by hereditary tendency as by either inhalation or ingestion.

545. Seeing that the disease is so very rife, particularly in aged dairy cows—in fact, the extent to which it is found in them is very appalling—it should be scheduled under a special Tuberculosis Act, or under a separate form or order of the Contagious Diseases (Animals) Act. The Government should, in dealing with such cattle, have a special form for destroying them, and compensate the farmer, butcher, or other parties financially interested. If the disease is so frightfully spread by the use of milk from tubercular cows as is generally thought, Government should then have all dairy cattle subjected to the action of the tuberculin test (the tuberculin being prepared under Government supervision and sold under registration), and those animals showing a rise of temperature should be separated from the others and destroyed, compensation being given according to circumstances; for if the malady can be communicated to the human subject by eating the flesh or drinking the milk of a diseased animal, then the sooner it is destroyed the better. Under no consideration should it be fed up and slaughtered for human food, as is generally done. I have tried the tuberculin test largely, both with healthy and diseased subjects, and find it generally to be a fairly reliable diagnostic agent; and on numerous occasions I have found that hypodermic injections of tuberculin arrests the progress of the malady even when the animals are in an advanced stage of the disease; and within a fortnight after the test has been applied, as a rule, the majority of cases commence to do well. If diarrhoea has been present, it is checked, and the animal feeds, chews the cud, and soon begins to put on flesh. This ought not to be allowed, and immediately a case is found by the veterinary attendant to show unmistakable clinical signs of the malady, it should be reported and destroyed. I have also made numerous post-mortems on rabbits and poultry, and found them very much affected with tubercular deposits in the lungs, liver, and mesentery.

546. Within the last few years a great deal has been said and written on tuberculosis. The general belief is that the microbe or parasite that caused the disease in the human subject and the domestic animal is one and the same. The late Professor Koch, the discoverer of the tubercle bacillus, as well as of the diagnostic agent tuberculin, however, startled the world in 1901, when he made it known at the Congress on Tuberculosis, held in London, that he had failed to infect animals with tuberculosis when they had been inoculated with the human bacilli, and that, after various experiments, he 'felt justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle.' Although not an experimenter, I have for years thought and said that there must be great difference between the two bacilli, and the matter is still doubtful. My reason for holding this opinion is that farmers, their families and servants—both male and female—do work among and tend cattle so affected, and who daily drink quantities of milk in a warm state, newly drawn from the udders of tubercular cows, are healthy people, and, as a class, it would be difficult to find another so free from consumption; and although the disease can be communicated from one cow to another living in close habitation, yet I cannot favour the idea that it is transmissible to the human subject by either drinking the milk or eating the flesh of tubercular animals, as for ages past an indirect practical test has been and is still carried on by these people drinking milk from infected beasts without any ill-effect; while I have seen butchers in trade in these tubercular subjects eat the flesh of tubercular carcasses, both raw and cooked, without taking any harm—in fact, they are splendid specimens of healthy subjects. The active immunity is possibly due to the opsonic condition of the blood of these people, which prevents them taking the disease.

547. With reference to the hereditary nature of the disease, the late Professor Koch says: 'Though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare'; and again he says: 'I should estimate the extent of infection by the milk and flesh of tubercular cattle, and butter made from their milk,

as hardly greater than the hereditary transmission.' While agreeing with him on the milk and meat question, my experience leads me to differ with him respecting the hereditary tendency of the malady. Calves are born tubercular, and the problem to be solved is, How do they become affected? It cannot be by direct ingestion or inhalation. Again, how can the fact be explained that the disease is known to run in certain families of the human subject for generations, such families cohabiting with other families that remain free? And the same holds good in certain bloods of cattle. If the disease itself is not directly transmitted at conception, then there must be a hereditary diathesis or a hereditary predisposition conveyed, which is well exemplified in the pearly flesh and apple-blossom cheeks of some of our bonny lads and lassies. The ptomaines produced by the bacilli may have a baneful effect on the germs of a future generation, rendering them liable to become, on development, a fruitful seed-bed for the propagation, growth, and distribution of a new series of tubercular bacilli. These bacilli, it may be taken for granted, are not all that is required. There must also be a suitable seed-bed, replete with all the necessary conditions for fostering and developing the growth of the bacilli. Although I am a strong advocate for plenty of fresh air, sunshine, and proper ventilation, all of which are highly necessary for giving healthy tone to the structures of the body, yet they will neither cure nor prevent consumption as long as the tubercular bacilli and suitable subjects are present. As a proof of this, the cows in New Zealand suffer as much from tuberculosis as those in the British Isles, yet they have plenty of sunshine and fresh air, living as they do in the open air, with the blue canopy of heaven as their covering. Though tuberculosis cannot be cured under the open-air treatment, it may be arrested; but the patient has to be well cared for, and is liable to have a relapse at any moment. With reference to the air-space so much talked about, it is not so much the matter of cubic feet of air as it is of proper ventilation. If the latter is not good the air-space avails little, as an infectious disease will spread as quickly in an unlimited air-space as it can in a limited one.

548. **Hoose, or Husk, in Calves.**—This is an irritation of the trachea and bronchial tubes, caused by small, white, thread-like worms (*Strongylus micrurus*) gaining access to the windpipe. It is not nearly so common as it was some years ago. The great cause is putting young calves out to grass during the autumn months (August and September) on strong wet and undrained soils, and leaving them there after sundown. The symptoms are first noticed in September and October, when the animals are heard to have a sharp, tickling, husky cough. They lose flesh fast, and soon show a starved appearance. Next the cough increases in frequency, and finally becomes very troublesome, being accompanied by occasional diarrhoea. Although the animal may still take its milk, it does not thrive, and finally it dies (worn out) from exhaustion, the post-mortem revealing large numbers of white, thread-like worms in the windpipe and bronchial tubes.

549. *Treatment* for this complaint is not at all times satisfactory. The affected animals should have good, warm, well-ventilated boxes and clean, dry beds. Turpentine, in dessert-spoonful doses, in a teacupful of linseed oil and milk, or with one or two eggs well beaten up in milk, given every third day, answers as well as anything. At the same time the system should be kept up as far as possible by giving linseed jelly or well-boiled gruel, made of equal parts of oat and barley meals and milk, supplementing it with a mixture of crushed oats, cake, bran, and a little *salt*. Fumigation with chlorine or sulphur fumes is sometimes resorted to, but I think iodine fumes are more beneficial. For the purpose of fumigation, 1 drachm of iodine should be placed on a hot brick, and this having been put into a bag, the calf's head should be held in the bag for a few moments. This destroys the worms, but the parasites have to be coughed up afterwards, so that good nursing is still required. In some parts of the country intratracheal injections of a mixture of turpentine, carbolic acid, chloroform, and oil of almonds are resorted to with great success. But the best thing is not to have the complaint at all; and, where the system is carried out of keeping the calves indoors, and giving them cake, corn, bran, and a little *salt*, until they are twelve months old, the trouble is rarely

heard of. Dressing the disease-producing grazing lands in early spring with 10 cwts. crushed rock-salt to the acre has a magical effect in preventing the complaint.

550. **Broncho-Pneumonia** (Inflammation of the Bronchial Tubes and Lungs).—Young calves, during the winter and early spring months, often suffer from acute bronchitis and pneumonia. The complaint is most frequently found in badly ventilated boxes, or 'hulls,' which have low-lying floors, wet, soppy beds, with bad drainage, and it is also the result of white scour, which it frequently follows, showing itself in from four or five up to ten or twelve weeks after the scour has subsided. It is considered due to disease-producing germs gaining access into the body through the navel openings. The symptoms, which much resemble hoose, are more acute, and are generally accompanied by diarrhoea; but no worms are found in the air-passages. The lining membrane, however, of the bronchial tubes is thickened, and the lungs are more or less consolidated in patches, having a reddish-blue colour. When first observed, the calves must be removed to better and more comfortable quarters, and a little mustard and water should be well rubbed into the sides behind the shoulders; also a mixture of 2 to 3 drachms each of acetate of ammonia, spirits of nitre, and syrup of squills, should be given three times a day. If the cough is troublesome, a teaspoonful of chlorodyne may be added. The food should be the same as recommended for hoose (*par.* 549).

551. **Acute Congestion of the Lungs** in calves is occasionally met with in an enzoötic form, having all the appearance of being infectious. I have seen six and seven calves, from one to two months old, die in as many days from this disease. The complaint is mostly seen in raw, damp, muggy weather, and, like bronchitis, is found in badly appointed boxes. The malady runs its course in about thirty or forty hours, and on account of the tender age of the patient and the acute nature of the attack there is very little chance for treatment to be successful. The calves must be removed at once to more comfortable quarters, and the treatment to be adopted is the same as recommended in *par.* 550.

### SHEEP.

552. Sheep are also subject to derangements and diseases of the respiratory organs, similar to those of other domestic animals; but on account of their fine organization and their open-air life, they are generally too far gone before they are noticed to be ailing and for any successful treatment to be carried out—certain parasitic diseases of the lungs excepted. In stormy wintry weather, when sheep are folded on unsheltered pastures, it is not uncommon to see and hear of large numbers dying of acute congestion and inflammation of the lungs, which, in some districts, rages like an epizoötic. When such is the case, the remaining animals should be removed to more sheltered quarters, and easily digestible and nutritious food should be supplied, such as crushed oats, bran, and cake. Lambs, at times, also die in great numbers from a somewhat similar cause, and must receive similar treatment.

553. **Verminous or Parasitic Bronchitis, or Hoose (Paper Skin).**—This is one of the most common maladies seen in lambs, and has already been dealt with (*pars.* 340 and 341).

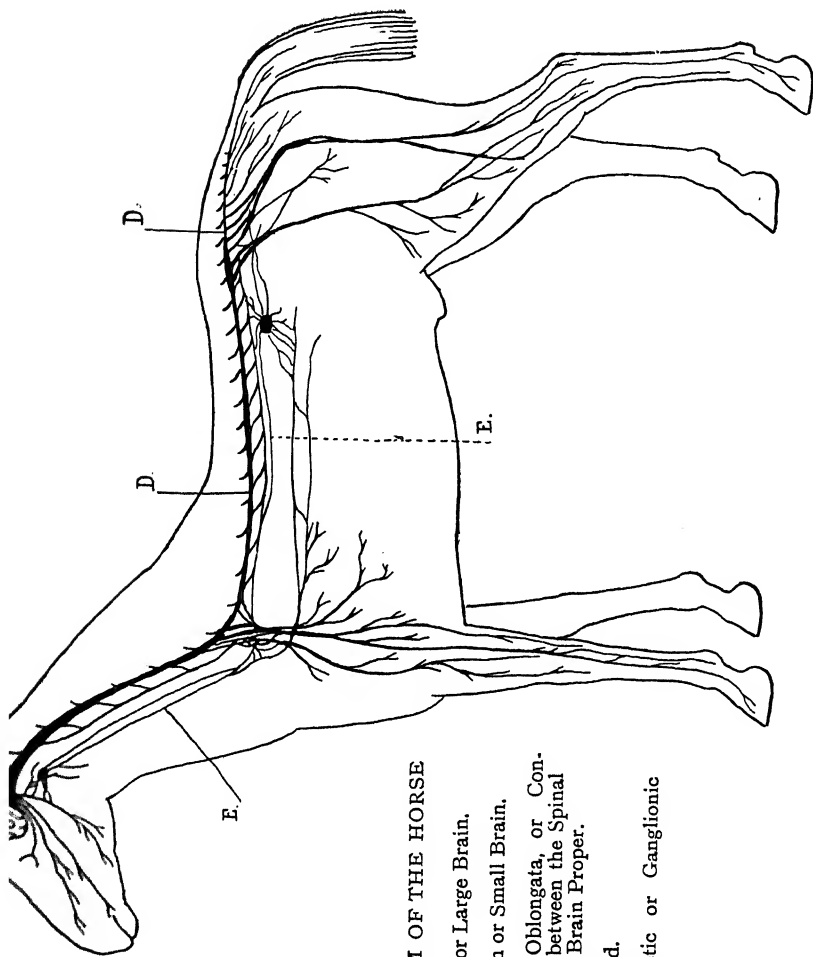
## THE NERVOUS SYSTEM

554. ALL the actions of the living body are governed, more or less, by the nervous system, which consists of two distinct portions—the *cerebro-spinal*, and the *sympathetic* or *ganglionic*. The brain is the great centre of the nervous system, and the special senses, such as smell, taste, etc., are connected with and controlled by it. Two of these special organs—*i.e.*, the eye and the ear—will be noticed in this lecture.

555. **The Cerebro-spinal system** (*Plate XXXVII., A to D*) embodies the brain, the spinal cord, and the nerves given off from each. Those from the spinal cord are for sensation and motion, whilst from the brain, as already indicated, there arise the nerves of special sense.

556. **The Sympathetic or Ganglionic system** (*Plate XXXVII., E*), that of the nerves of organic life, are not immediately under the influence of the will, and are made up of a double chain of knots or ganglia. They run through the length of the body, on each side of the back-bone, and give off fibres to control the involuntary movements of the internal organs, such as the heart and bloodvessels, respiratory and digestive organs, etc., these fibres having free communication with the spinal nerves.

557. **The Nerve Tissue** itself is composed of both a fibrous and a cellular structure. The latter (grey substance) is found in the outer portions of the convolutions of the brain, and in the middle of the spinal cord and the ganglionic nerve centres, while the fibrous



# NERVOUS SYSTEM OF THE HORSE

- A. The Cerebrum or Large Brain.
- B. The Cerebellum or Small Brain.
- C. The Medulla Oblongata, or Connecting Link between the Spinal Cord and the Brain Proper.
- D. The Spinal Cord.
- E. The Sympathetic or Ganglionic System.



substance is both white and grey, and is found in the white matter of the brain and spinal cord.

558. **The Brain** consists of soft white and grey nervous matter, and fills the irregular cavity of the skull or cranium. It is divided into four parts:

1. The **cerebrum**, or large brain (*Plate XXXVII., A*), composing about three-fourths of the whole organ.
2. The **cerebellum**, or small brain (*Plate XXXVII., B*), situated immediately behind the cerebrum.
3. The **pons varolii** (*Plate XXXVIII., B 4*), or bridge, connecting the right and left portions of the cerebellum.
4. The **medulla oblongata** (*Plate XXXVII., C*), or connecting-link between the spinal cord and the brain proper.

559. **The Brain** is covered by three coats or membranes, called the **meninges**. These are: (1) **dura mater**, a tough, fibrous membrane, lying in immediate contact with the bony skull; (2) the **arachnoid** membrane (spider-web), or middle coat, a very fine, delicate membrane; and (3) the **pia mater**, which covers the surface of the brain—a very fine, extensive membrane, made up of a network of small bloodvessels. The last-named membrane follows and covers all the convolutions of the brain, and supplies it with blood.

560. **The Cerebrum** (*Plate XXXVIII., A 1 1 and B 1 1*), or large brain, is divided by a fissure into two hemispheres, each of which is mapped out into numerous convolutions of grey matter, covering white fibrous nerve material. The cerebrum is said to be the main seat of sensation, reason, and will.

561. **The Cerebellum** (*Plate XXXVIII., A 2, B 2 2*), or small brain, has a middle lobe (vermis) and two lateral hemispheres, made up of convolutions that are smaller than those of the cerebrum, and differently arranged. The grey nerve substance is abundant, and external to the white nerve tissue. The cerebellum is thought to control and regulate the voluntary muscular actions of the body.

562. **The Medulla Oblongata** (*Plate XXXVIII., A 3, B 3*).—The connective medium between the brain and the spinal cord consists of white and grey nerve matter, but differs from the brain proper in having the grey matter internally. Its functions are of vast importance to life, as it regulates and controls the actions of breathing, swallowing, etc.

563. **The Spinal Cord** (*Plate XXXVII., D, and Plate XXXVIII., C 1 to 8*) is a long irregular, cylindrical mass of nerve matter running through the vertebral column. It is composed of white matter externally, the centre being grey, and, like the brain, it is covered with three similar membranes. As it passes along the vertebral canal nerves are given off in pairs, and pass out between each vertebral section. The *upper root* of these nerves is sensory, conveying sensation from the part of the body to which it is distributed to the brain. The *lower root* of these pairs, on the other hand, conveys motor power from the brain to the muscles, etc., that are supplied by it, these being more or less under the control of the will.

564. **The Cranial Nerves**, or nerves given off from the brain direct, are arranged in pairs, twelve in number :

1st pair.—The olfactory, which go to the nose, and give the special sense of smell.

2nd pair.—The optic, which go to the eyes, and give the special sense of sight.

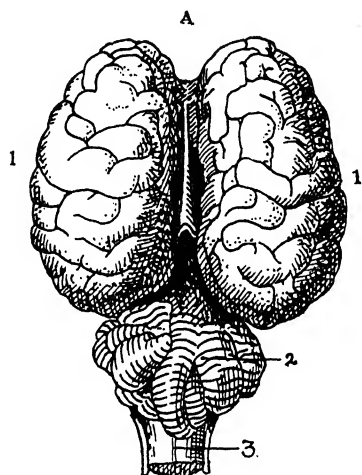
3rd pair.—The *motores oculorum*, which supply the muscles of the eyeballs (with two exceptions) with motor power.

4th pair.—The *pathetic*, which supply one muscle of each eyeball with motor power.

5th pair.—The *trifacial*, which are mixed (sensory and motor) nerves, and supply the different parts of the face, tongue, etc.

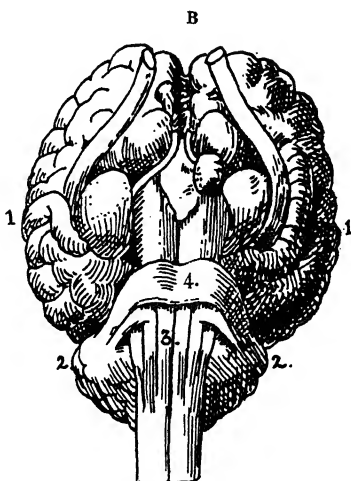
6th pair.—The *abducens*, which supply one muscle of each eyeball with motion.

# PLATE XXXVIII



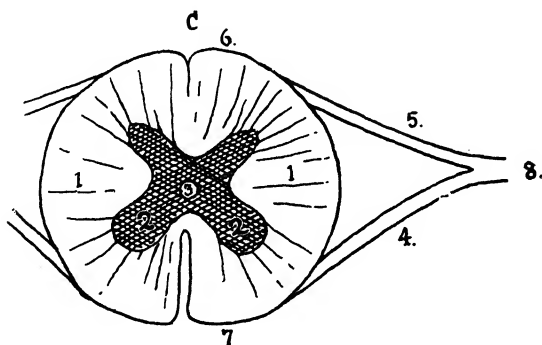
A. BRAIN OF HORSE—UPPER SURFACE

- 1, 1. Cerebrum—Right and Left Hemispheres.
- 2. Cerebellum.
- 3. Medulla Oblongata.



B. BRAIN OF HORSE—UNDER SURFACE (BASE)

- 1, 1. Cerebrum—Right and Left Hemispheres.
- 2, 2. Cerebellum.
- 3. Medulla Oblongata.
- 4. Pons Varolii.



C. TRANSVERSE SECTION OF SPINAL CORD

- 1, 1. White Matter.
- 2, 2. Grey Matter.
- 3. The Central Canal.
- 4. Motor Nerve (Under Side).
- 5. Sensory Nerve (Upper Side).
- 6. Superior Surface.
- 7. Inferior Surface.
- 8. Junction of Sensory and Motor Nerves.

7th pair.—The facial, being the great motor nerves of the face.

8th pair.—The auditory, which go to the ear, and supply the special sense of hearing.

9th pair.—The glosso-pharyngeal, being the mixed sensory and motor nerves that go to the tongue, pharynx, etc.

10th pair.—The pneumogastric or par-vagus, being mixed nerves that supply stomach, heart, lungs, pharynx, trachea, etc. These are very important nerves.

11th pair.—The spinal accessory, which are motor nerves.

12th pair.—The hypo-glossal, which supply the tongue, and are also motor nerves.

565. Although the brain is the seat of emotion, reason, and sensation, it is of itself non-sensitive, as portions of it may be cut away with little or no effect. I remember a case where a groom was thrown from a horse, and kicked on the side of the head just above the left ear; the skull was driven in, and a portion of the brain protruded  $1\frac{1}{2}$  inches. It could be handled with the fingers without causing the patient any uneasiness, yet, if his lips were touched, the body was thrown into frightful contortions, he being at the time semi-conscious. The protruding portion was left alone, when it gradually receded, and within a week had returned to its proper place, a splendid recovery being made.

## DISEASES OF THE BRAIN AND NERVOUS SYSTEM.

566. **The Functional Derangement and Diseases** of the brain and nervous system are not of so frequent occurrence in the domestic animals as they are in the human subject, yet, from their peculiarity and obscurity, they are most interesting, arising as they do from a great variety of causes. *Functional disturbance* is, in many cases, due to *reflex action*, the real cause being very remote from the brain—as,

for instance, derangement or disease of any portion of the digestive organs, such as stomach-staggers in horse and cow, or worms in the stomach and intestines; or it may arise from affections of the urinary and generative systems, such as hysteria, epileptic fits, puerperal eclampsia and parturient apoplexy, biliary and uræmic poisoning, and it also may be due to mineral (lead) and vegetable poisoning. Before, therefore, suitable treatment can be adopted, it is of the utmost importance to find the cause; failing this, the acute and most prominent symptoms must have immediate attention, and be relieved as far as possible.

### DISEASES OF THE BRAIN.

567. Professor Williams, in 'The Principles and Practice of Veterinary Medicine' (p. 619, 9th edition), gives in a tabulated form the difference in symptoms, so as to distinguish between disease of the brain substance and of its coverings. Usually, when the substance of the brain is affected, the symptoms are of a quiet, drowsy nature, whereas, when the coverings are attacked, the symptoms are of a very excitable, convulsive, and spasmodic character.

568. **Phrenitis**, or inflammation of the brain and of its coverings, in the horse is, happily, very rare. In two cases observed by me the horses were seized suddenly, and commenced to worry and bite surrounding objects. On putting them into a loose-box, they roamed round and round, rushing first to one side, and then to the other, biting at the manger and hay-rack, snapping at the bars of the latter, and even worrying at their own limbs, attempting to climb up the sides of the box with their fore-feet, falling over backwards, and, when lying on their side, the limbs moved as if in full trot; the breathing was loud and quick, perspiration rolled off their bodies, eyes were staring, rolling, and bloodshot, mouth open and frothy, and at intervals they gave out peculiar screams or cries. When on their feet they were dangerous to approach. *Treatment*.—While down, the animals were secured and well bled from the temporal artery; chloral hydrate and bromide of potassium were also administered, and cold water

applied to the head, but all to no purpose, as both animals had to be destroyed.

569. **Organic changes**, such as abscesses in the horse's brain, may arise from complicated or 'bastard' strangles. This pyæmic form of strangles, unfortunately, in some seasons is not uncommon. Like the commencement of all brain affections, when the abscesses are developing in that organ, there is great drowsiness and dullness, the horse hangs its head in a sleepy condition, with pulse full and slow, and breathing quiet and deep, and any food that is taken is eaten in a sort of mechanical manner. As the case progresses, the animal commences to wander round the box, presses its head in the manger, or against the wall, the breathing and pulse become quicker, and finally the animal hangs its head on one side, and day after day walks, so to speak, round and round its own head, making it a centre. These cases always end fatally. On post-mortem, the brain is found to be a mass of pus, or matter, thus showing, in cases of simple strangles, how necessary it is that every care and attention should be paid at the commencement, and remedial measures be adopted so as to prevent these fatal terminations.

570. **Hydrocephalus**, or water on the brain, I have met with in young foals, their foreheads being, as a result, much enlarged and distended. The little animals were very dull and sleepy, yet they took milk freely. As they grew bigger and stronger, the water became absorbed, and after small doses of bromide and iodide of potassium, with a little exsiccated sulphate of iron, had been given daily, the bones of the head flattened down into their normal condition. These cases are more frequently found in the fœtus, before birth—in calves particularly—when the bones of the skull have to be broken down with knife, hook, or forceps, before delivery can be accomplished.

571. **Ectopia Cerebralis** is a congenital malformation where the brain is developed outside the bones of the skull, and has been found in cases at parturition, and, although the young animals may be fully developed and born alive, they soon expire.

572. **Tumours** in the brain of adult animals are met with occasionally, and may exist for some time without causing any disturbance, but the first symptoms to be noticed are those described under abscesses. Setons and blisters behind the ears may be serviceable, and iodide and bromide of potassium may be given night and morning, in doses of 1 to 2 drachms each. Tumours of a **tubercular** nature are more commonly found in the brain of the cow, with symptoms analogous to those given under abscesses in



FIG. 14.—HYDROCEPHALUS IN CALF (WATER ON THE BRAIN).

the brain of the horse (*par.* 569), and including loss of sight, etc. There are numerous other tumours found in the brain, the chief of these being of the **bony** and **melanotic** varieties.

573. **Sturdy, Gid, or Turnsick**.—This is an affection of the brain due to the presence of a brain tumour, or, rather, a watery cyst or bleb, which is the cystic stage of the *Tania cœnurus*—a tape-worm affecting the dog. This cyst, which is known as the *cœnurus cere-bralis*, is developed from the eggs in the segment of the worm, which

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is passed out of the bowel along with the fæces. The segment contains a large number of eggs, and is supposed to be taken up and swallowed along with the herbage on which the animal feeds. On reaching the stomach, the heat therein soon sets the young embryo at liberty, and it is then taken into the circulation and carried by the blood-stream to the brain, which, being its natural habitat, is preferred to any other part of the body, and therefore selected for its abode and further transformation. Here, by its hooked processes, it finds its way through the walls of the vessels into the substance of the brain, and there the cyst, or hydatid, is formed (*Plate XIX., Fig. f.*). Should the brain of a sheep or calf containing this cyst be given to a dog, tape-worms of this particular kind will again be reproduced, and so the cycle of life is carried on. Sheep are more subject to this affliction than any other animal; but I have seen a number of young stirks, aged from twelve to eighteen months, affected, and of these several recovered after being operated upon.

574. *Symptoms.*—The first symptom noticeable is an unsteady gait and a gradual loss of flesh by the animal, which carries the head on one side and walks in a circular direction; or it may hold the head upwards and backwards, and walk with high-stepping, jerky action. This variation in the symptoms depends upon the part of the brain affected: if on the right side of that organ, the animal will circle to the left, and *vice versa*; while, if in the middle, the animal steps high and jerky.

575. *Treatment.*—Many farmers and shepherds are expert operators for the removal of the cyst. The old method of operation was to determine the position of the cyst by feeling for a softening of the bone. The wool was then clipped off, and the part burnt through with a red-hot poker; a goose-quill was next inserted, and by its means the fluid and hydatid sac were removed. A plaster of tar or pitch was next placed over the part and completed the operation. The new form of procedure is to open the parts by means of a fine trocar and canula and to draw off the fluid with the aid of a syringe, the sac being next removed by a pair of forceps. Success in these operations greatly depends on the locality of the tumour.



576. *Prevention*.—Seeing that the disease originates from a tape-worm in the dog, the method of prevention is obvious. Dogs must either be kept off the pastures or else they ought to have periodical doses of worm medicine, and while under treatment it is well to keep them closely shut up. The heads and brains of diseased sheep should be burnt instead of being given to the dogs, as is generally the case. Applications of salt to the pastures also have a good effect.

577. **Concussion of the Brain**, due to a severe blow or injury to the head, is, in the horse, generally the result of the animal rearing up and falling over backwards, or of running away and coming suddenly in contact with some obstruction. When there is no fracture or displacement of the bones, the horse may lie quiet (stunned) for a short while, and then, regaining consciousness, get up and seem none the worse. In these cases care must be used, and the animal kept perfectly quiet for a few days; little or no food is to be given for the first twenty-four hours, and then feed sparingly for a few days after with easily digested food. In other cases the animal may lie motionless, with little or no sensation, the eye rolling about with the pupil dilated, pulse small and quick, and breathing slow and heavy. These symptoms may last for three or four days, after which the patient begins to show signs of consciousness by attempting to raise its head, and if assisted to a recumbent position (by the attendant placing his knee behind the horse's shoulder), it may drink a few mouthfuls of cold water. With such a case there is a chance of recovery, provided that from the time of the accident the patient has had every attention, having been carefully turned over from side to side every six or eight hours, and well bedded with clean, dry straw, the urine removed with the *catheter*, and the rectum emptied by the hand every eight hours, a good dose of opening medicine having been given at the outset—viz., 4 to 6 drachms of aloes dissolved in  $\frac{1}{2}$  pint of hot water, along with 12 to 20 ounces of linseed oil. When the animal shows signs of recovery by endeavouring to rise, it should be carefully lifted on to its feet by the aid of slings and chain-blocks. After the first few minutes' struggle in attempt-

ing to find its feet, it is astonishing how rapidly recovery ensues. Again, cases have occurred where portions of the occipital bone which articulate with the first bone of the neck (atlas) have been fractured, but not displaced, until several hours after. In one case which came under my observation, on the animal falling over backwards, it instantly jumped up, walked about a dozen steps, then fell on its side as if shot, lying with legs extended, eyeballs rolling about, breathing heavily, and giving now and again a few spasmodic struggles with the fore-legs. It never rose again, and finally died suddenly, from the fractured pieces of bone becoming displaced, and pressing upon the medulla oblongata—the connecting medium between the brain and spinal cord. In cases of this kind, it is advisable to keep the animal as quiet as possible, and await results.

578. **Apoplexy, or Congestion of the Brain**, is extremely rare, though very sudden in its attack. It may be described as occurring in two forms—either from some organic lesion of the brain, or from reflex functional derangement. In the former it may be due to an overloaded or congested state of bloodvessels, causing pressure on the brain substance, or from rupture of a vein with *hæmorrhage*, and the formation of a clot, causing loss of power and sensation. When such cases affect the horse, sensibility and motion are completely lost, a fatal termination occurring in a few hours.

579. **Functional Apoplexy**.—This may be best described under that very common complaint known as parturient apoplexy.

## DERANGEMENTS AND DISEASES OF THE NERVOUS SYSTEM.

580. **Parturient Apoplexy, Milk-Fever, or Dropping after Calving** (a partial or total loss of power).—Of all our domestic animals the cow is by far the greatest sufferer from this complaint, though, as a rule, it is only attacked at the third or subsequent calving. The Ayrshire and shorthorn breeds seem most predisposed to it, but in certain localities and on certain soils heavy milkers of

any breed are liable to it, especially if at grass, when its effects are more fatal than when they are fed on dry food indoors; it is, however, not so frequent nor yet so fatal when cold east winds prevail. Moreover, it seldom follows where there has been any difficulty in calving, it being most common when the cow has calved without any assistance. The real cause of this so-called milk fever is not yet exactly known. My opinion is that it is due to a succession of shocks to the system: first, through the easy expulsion of the waters and calf from the womb; secondly, through the removal of the calf from the presence of the mother, and not allowing her to enjoy the pleasure of licking and cleaning it with her rough tongue; thirdly, through excitement and shock caused by the withdrawal of all the milk at once, either before or after calving, *thus removing the pressure too suddenly*, which is the whole crux of the matter, this in turn inducing paralysis of the milk cells, a total cessation of the milk secretion, and collapse of the nervous system.

581. The paralysis of the milk-producing parts of the udder is caused by the sudden withdrawal of all the milk at once, then the nervous power is impaired *by the pressure being too quickly removed*, and the secretion of milk is thus suspended. It stands to reason that the elements entering into the composition of the 'colostrum,' or 'beastings,' which are of a nitrogenous nature, and at this time contained in the system of the cow—more particularly if the animal is a deep milker—would naturally be eliminated from the body by the function of the udder. But as the udder is not acting, these elements are retained in the circulatory system, where they not only act as a foreign body, but have a toxic effect on the nerve centres, and cause the peculiar excitement seen in the early stages of the derangement, this excitement being succeeded by total prostration of the whole nervous system, in which all the organs of the body participate, and is followed by congestion of the structures.

582. *Symptoms.*—As a rule, milk fever symptoms are noticed from about four to six hours after the second milking, or from a few hours after calving up to, say, the fifth day, or until the beastings are cleared out of the system. Occasionally the symptoms are recog-

nizable prior to calving, particularly if the cow, owing to the great distension of the udder, has been milked. The first symptom to be noticed is a thoughtful expression of the face, manifested by a peculiar holding up of the head and pointing out of the nose, while the eyes stare right in front; there is also paddling of the hind-legs and switching of the tail, while the animal staggers about the stall with a spasmodic, rigid twitching of the muscles in the region of the stifles, which seem to be pulled backwards, and, to a certain extent, are beyond control. This is followed by a stage of excitement, when the animal tumbles all over the place—first on to its shoulders, then on to its head; or it may fall on to its side, and lie with its legs extended, the abdomen distended like a drum, breathing heavily, tossing the head about, rolling the eyes, and finally sinking into a deep coma. In other cases, it may fall on to the breast-bone and belly, roll the head from side to side, and then turn it towards the flank, resting the lower jaw on the ground, and in this position it falls into a comatose condition (*Plate LI., 22*), in which state it may remain for many hours.

583. *Treatment.*—This was not always as satisfactory as could be wished, depending as it does upon the nature and severity of the attack and upon the age and condition of the patient, while the earlier the attack, the more difficult is its treatment. The normal temperature of the cow ranges from  $100^{\circ}$  to  $102^{\circ}$ , yet in milk fever cases the temperature as a rule falls to  $99^{\circ}$  or  $97^{\circ}$ . Should the temperature rise to  $104^{\circ}$  or  $105^{\circ}$ , and the animal be very wild and excitable, the abstraction of from 3 to 5 quarts of blood has a beneficial effect. Formerly I used to wash the body all over with several pails of cold water. Then I scraped the animal well down, and applied a sheet wrung out of cold water, over which was put two or three dry woollen rugs, and to cover all, a waterproof. Next a dose of chloral hydrate and bromide of potassium,  $\frac{1}{2}$  ounce to  $\frac{3}{4}$  ounce of each, dissolved in cold milk, was given, followed by 2 pounds of castor oil and 2 pounds of treacle in gruel as a drench. *Since writing the first edition the treatment of milk fever in cows has undergone a great change.* Immediately an animal is attacked, under the new treatment all the milk

is drawn from the udder; next an injection is made by dissolving 2 drachms of iodide of potassium in 1 quart of water that has been boiled and allowed to cool down to 90° F. A fourth part of this solution is then injected by an ordinary india-rubber enema syringe, to which a special teat-tube is attached, into each quarter of the udder. This treatment is known as that of Schmidts, a German expert, and was soon after followed by injecting 1 drachm of chinisol in a solution the same way, instead of the iodide of potassium; pure oxygen and filtered air were also injected with equal, if not better, results. These modes of treatment go to confirm the view I held in 1877, for in an article written that year by me I drew attention to the fact that milk fever in the cow had its origin in the mammary glands, and that the real exciting cause was the removal of the pressure by the too sudden withdrawal of all the milk; and now, by the simple process of inflating the udder with filtered atmospheric air, it proves that it is not a septic condition of the milk cells, but merely a collapse of the functions of the udder caused by the removal of the pressure, as now the only treatment necessary is to inflate the four quarters of the udder with atmospheric air filtered through medicated cotton-wool, by means of a teat-tube fixed by a special arrangement to a bicycle-pump. As each quarter is blown up tense and tight, a piece of broad tape is tied round the teat, to be removed in about six or eight hours after. In many bad cases this treatment has a marvellous action, for in the course of four to six hours the cow is on her feet. Great care, however, must be taken that the teat-tube and fittings are scrupulously clean. The teat-tube must be scalded in boiling water before and after use. If care is not taken to have instruments and vessels clean and disinfected, there is danger of inducing mammitis, or inflammation of the mammary gland. Under this treatment, purgatives, as a rule, are not required, for in the course of thirty to forty hours slight diarrhoea generally follows. In all cases the animal should be kept trussed up on its breast-bone and belly with bundles of straw or bags of chaff or sawdust. *Never allow the cow to lie on its side*, and, with the exception of turning it from one side to the other occasionally, leave the patient alone. The hand in some cases may be well soaped and introduced into the

rectum and the hard-baked dung cleared out, and, if necessary, the catheter passed and the urine removed.

584. When coma sets in no attempt should be made to force anything down the animal's throat, as there is great danger of its passing down the windpipe on to the lungs and producing congestion, or perhaps a fatal lung affection. Subsequent treatment must be adapted to the progress of the case. If in the course of from twelve to twenty-four, or even thirty-six hours, the patient begins to show signs of returning consciousness by holding the head up, pricking the ears, and looking round, it should be offered a few mouthfuls of cold water, bran or hay-tea. After a little while it will attempt to rise to its feet, and evince a desire for food by eating the bedding, while the secretion of milk returns. When this takes place nothing more is required but nursing the cow for a few days. A small quantity of milk should, however, be removed at intervals of from six to eight hours. I do not agree with continually drawing off the milk as fast as it is secreted, and therefore recommend leaving some in the udder to stimulate further secretion. Frequent hand rubbing is also of very great service as a stimulant to the gland.

585. *Terminations.*—In many cases, after the apoplexy has passed off, and the secretion of milk has returned, the animal may be feeding and chewing the cud, yet it cannot get up. In some instances the patient recovers the use of its limbs in the course of from three days to three weeks, or it may linger on for six or seven weeks, having to be turned from side to side four or five times in the day. In other cases, although it regains the use of the fore-limbs, the hind ones remain paralyzed, and the animal is consequently sold to the butcher. Again, according to the severity of the attack, the case may terminate fatally in six or eight hours, or it may linger on in a comatose condition for several hours. If the patient gets into a relaxed condition, settles flat down into the bed, and seems to lose all tone of the muscles, has the hind-legs wide apart, sits on the hocks, the points of which stick out below the rump-bone, breathes heavily, puffs at the cheeks, drops the lower jaw, and shows no

sensation when the eyeball is touched, its condition may be looked upon as hopeless.

586. Sometimes gangrene takes place in one of the hind-quarters of the body, arising either from the rupture of a bloodvessel or from extreme congestion. An animal thus affected may regain consciousness, and even take food, but the breathing is very quick and laboured, while the affected quarter swells up, and on being tapped by the fingers has a rattling sound. Such cases almost always have a fatal termination, though now and again an odd case survives the attack, and so far recovers that it commences to feed, chew the cud, and seems to do well for five or six days, after which it begins to cough, loses its appetite, and finally dies from breaking up of the lungs, or what may be termed acute consumption, caused by the congested state of the vessels of the lungs during the coma, or from matters that have been horned in falling into the windpipe and bronchial tubes.

587. From experience, I would recommend in all cases of milk fever that occur after the fourth calving, if the animal is in prime condition and the attack severe, that the butcher be called in.

588. *Prevention of Milk Fever.*—In this respect I would note four points. First, if possible, do not turn the cow out to grass until it has calved, and give plain food of not too watery a nature. Second, immediately the cow shows signs of calving, have it removed to a loose-box for that purpose, and leave it there with the calf for four or five days, or until the beastings are all cleaned out. This can be easily ascertained by boiling the milk, when, if colostrum be present, the milk will curdle. It is a good practice, also, to remove a little milk from the udder occasionally by the hand. Third, five or six days before the cow is due to calve give 2 pounds castor oil in treacle gruel, and repeat the dose twenty-four hours prior to calving, or as near that time as possible. This treatment I have found to be of the greatest benefit. Salts do not answer in my district neither before nor after calving. Fourth, if the calf and mother cannot be left together for four or five days, then only small quantities of milk

should be withdrawn every four or five hours. *Never on any account take all the milk at once from the big congested udder of a deep milker.*

589. **Hysteria**, a nervous derangement with or without convulsions, although very rare, is sometimes met with in both the mare and the cow, but more frequently in the latter. It seizes the animal very suddenly. More particularly is this so when it is coming into service for the first time. In the mare, at times, the head is pulled upwards and backwards, the eyes are very watchful, the nostrils are dilated, and on touching, or even approaching, the patient it becomes very excited. It may kick and struggle, or rear up and fall over backwards. In the heifer the symptoms are somewhat similar to those in the mare. It is, however, more subject to convulsions, and falls down suddenly, bellows loudly, champs and foams at the mouth, and grinds the teeth. The eyes roll about, and there are strong muscular tremblings, and contortions of the limbs and neck, as if the patient was in a fit.

590. *Treatment for Hysteria.*—Bleeding to the extent of 5 or 6 quarts is very useful, followed up by dashing cold water over the head; and after the paroxysm has passed,  $\frac{1}{2}$  ounce each of chloral hydrate and bromide of potassium in a pint of cold milk should be administered. If desirable, 1 to 2 drachms of the extract of belladonna may be substituted for the chloral and bromide. From 20 to 30 ounces of linseed or castor oil should also be given, and it may be found necessary to repeat the bromide every eight hours. As a rule, however, the symptoms disappear in a few hours.

591. **Epilepsy (Fits)**—involuntary spasms and contortion of the muscles, with sudden loss of consciousness. This peculiar nervous derangement may arise from a number of causes, such as retarded dentition; worms in the stomach and bowels; improper food, causing intestinal disorder; and uterine complications. The attack is generally very sudden; the animal stops instantly, trembles all over, and falls to the ground, the whole muscular system being thrown into violent contortions. There is a peculiar rocking and working of the head and limbs, and rolling of the eyeball, which turns in under the



upper eyelid. The teeth are firmly held together, and a frothy discharge comes from the mouth. The heart beats fast and loud, while the breathing is suspended for a few moments, and dung and urine are involuntarily ejected. After the convulsive attack has passed, the patient frequently falls into a long deep sleep, from which it awakes, showing little or no ill-effects, with the exception of a slight languor and listlessness. The **pig** and the **dog** are the greatest sufferers from this affliction. Young pigs are very often attacked, especially if fed too largely upon badly prepared maize meal. This stuff, therefore, should always be *well boiled*, and even then used very sparingly amongst young pigs under two months old. Feeding on pollards or parings answers much better, and is certainly safer. In the dog, retarded teething and tape and other worms in the alimentary canal are responsible for most cases of epilepsy.

592. *Treatment of Fits.*—When the patient is seized every care should be taken to keep it from injuring itself, and a free access of air should be allowed in all cases. Benefit will be derived from a continual cold-water *douche* on the head. If the teeth are firmly clinched together, a piece of wood or some other suitable substance must be pressed in between them, to prevent the tongue being injured. After the attack has passed over, a careful examination ought to be made to discover the cause. If the teeth are at fault, the offending ones or shells must be removed, and, if necessary, the gums scarified; but if worms are suspected, a dose of worm medicine (*par. 1074, No. V.*), followed by a purgative, should be given. As a nerve sedative, either the bromide of soda or potassium (*par. 590*) may be administered with advantage.

593. **Puerperal Eclampsia** (an Epileptic Form of Nervous Excitement).—Several cases of this have come under my observation, in cows on the point of calving as well as in cows that have been calved several days. At first the cow is noticed to be very excitable, paddling with the hind-feet, switching the tail, pointing out the nose, and holding the head upwards and backwards; the eyes are wild and staring, and the milk secretion is partially suspended—in fact, the animal shows all the early symptoms of an attack of milk fever.

But by far the most prominent symptom is the extreme sensitiveness of the skin, for the moment an attempt is made to touch its body the cow will give a loud bellow, open the mouth wide, stick out the tongue, and attempt to jump to one side and kick out. The breathing is very quick, and the pulse is full and strong. *Treatment*.—Bleeding to the extent of from 4 to 6 quarts, followed with from 4 to 8 drachm doses of chloral hydrate in 1 pint of cold milk, is serviceable. This medicine can be repeated four or five hours afterwards, if required. The following, however, should be administered as a purgative, viz.: 2 pounds castor oil and 2 pounds treacle, in 2 quarts of thin gruel. As a rule this mode of treatment, along with spare feeding on nice digestible food, is very successful.

594. **Sunstroke** (*see Stomach Staggers, pars. 244 and 304*).

595. **Louping-III, Trotter-III, Trembling, or Sheep Staggers** (Trembling Paralysis in Sheep, Williams).—This malady is more common in sheep than in any other animal; cows, however, are sometimes affected. It is mostly seen in Scotland and the North of England, more particularly in Northumberland. It generally appears in the spring, about the middle of April, and in some localities again in October, seeming to be greatly favoured by cold, showery weather. For years great loss has been sustained by its ravages, and numerous investigations have been carried on for the discovery of the cause, yet there is still a great difference of opinion on this point. Farmers and shepherds living on the disease-producing or affected farms say that wherever the rough, coarse, white grasses (principally the dead and decaying foliage of the previous year's growth of sweet-scented vernal [*Anthoxanthum odoratum*], known as 'tath') are in abundance the complaint is rife, and they have an idea that these grasses have something to do with the malady. The late Principal Williams, of the New Veterinary College, Edinburgh, from investigations carried on by him for some considerable time, was of opinion that the malady was due to a specific microbe, and that the tick (*ixodes*) played a very important part in acting as host for some of the transformations of the germ. Dr. Klein, in 1893, investigated the matter for His Grace the Duke of Northumberland,

K.G., and reported that—‘*The disease has a seasonal and local epidemic character*,’ and that ‘*the malady strongly pointed as belonging to the class of infectious diseases, and was, apparently, communicated from one animal to another*.’ Yet he says: ‘*The causa cansans of the disease is contained on or in the soil*’; also, ‘*When the disease prevails, a fence between one sheep farm and the next is occasionally found to be the boundary between the infected and non-infected area*.’ Now if the soil be the cause of the first case, why should it not be the cause in all the succeeding cases that are susceptible to its influence, seeing that as many as from seven to ten sheep will die in twenty-four hours? My view is that louping-ill is allied to certain enzoötic diseases, and, like red-water in cattle, is common to certain localities and soils from the same common cause. I think it is due to the indigestible and innutritious nature of the decaying grasses, producing derangement of the digestive organs and deterioration of the blood, and this in turn acts on the nerve centres, inducing a want of co-ordination of movement, hence trembling and imperfect action of the limbs. Or the complaint may be from some reflex nervous action, arising from the irritating effects of the innutritious herbage on the stomach, producing the symptoms peculiar to the malady. Professor Hamilton, M.B., F.R.C.S.E., of Aberdeen, and his colleagues, who have been investigating some of the diseases affecting sheep since 1901, in their report to the Departmental Committee of Agriculture, state that louping-ill in sheep, like braxy (*par.* 329), was due to the presence of a coarse-looking, rod-shaped, spore-bearing organism, named by the professor *Bacillus choreæ paralyticæ ovis*, Hamilton, found in the fluid in the peritoneal cavity—cavity of the belly—and also in the intestines, and that from the numerous experiments conducted by them the bacteria or their spores were taken up in the food into the alimentary canal, wherein they multiplied and were evacuated in quantities with the excrement, and by these means the pastures were contaminated, while at certain periods of the year (July and August) the blood of the sheep had a protective influence, but in spring (April to June) it lost this property, and the sheep were rendered liable to be attacked with louping-ill; and also that a soup prepared from the disease-producing fluid found in the cavity of the belly, when administered to the sheep in the autumn months, had a tendency to prevent the disease.

596. *Symptoms*.—The first symptoms to be noticed are that the head is carried erect, with staring eyes, and that there is a staggering, jerky gait, with muscular twitchings and tremblings of the body. Next the falling down and struggling of the animal will attract attention, and this will be followed by convulsions, paralysis, and death. Many of the animals die suddenly; others linger on for several days, and finally recover, when removed at once from the disease-producing pasture and carefully nursed. If certain animals recover when removed from an affected area, there appears to be some hope of preventing in some degree an outbreak of the malady.

597. *Prevention*.—Whether the disease is due to the coarse indigestible grasses, or to the disease-producing germs either conveyed by the medium of the tick or by being deposited on the ground in the dung, it is evident that the ground or the pastures in certain localities is the medium for conveying the infection, and as a preventive I would recommend—(1) That, at the back end of the year, the mowing-machine should be run over the land to cut down all the rough coarse grass, and this may be left on the ground to rot, and so act as a manure for the succeeding year's grass, or be burned. (2) When practicable, apply from 10 to 12 cwt. rough crushed salt to the imperial acre, which will not only kill the grass, but the disease-producing germs deposited on the ground, as well as the tick, will also be annihilated (providing the tick has its winter shelter amongst the grass). (3) If this cannot be done, then lay large lumps of rock salt all over the pastures for the sheep to lick at their leisure. In the west of Cumberland (Millom), a large park was for years notorious for red-water and dysentery in cattle, and sheep staggers (louping-ill) in sheep, as many as 100 fatal cases of the last-mentioned occurring in one season. Yet by the application of 120 tons crushed rock salt to the grazing portion of the park these diseases were eradicated. The same success has also attended the application of salt to disease-infested areas both in Surrey and Leicestershire, and the result of a 10-ton trial on a 20-acre field at Leithen Hall, near Moffat (which took place in 1896), has clearly demonstrated that whatever be the cause, dressing land with salt may now be regarded as a specific for louping-ill.

598. **Chorea, Shivering, Stringhalt, or Clicking,** are modified forms of a peculiar derangement of the nervous system (characterized by involuntary spasmodic muscular jerkings, twitchings, and tremblings) that is analogous to St. Vitus's dance in the human subject. The cause of the derangement is not really known; some authorities say it is due to lesions of the brain, and others to an affection of the spinal cord. There are, however, various other theories. Although the disease may have a hereditary tendency, my opinion is that, in the majority of cases, retarded dentition has a great deal to do with inducing it (*par.* 350), as the complaint is seldom noticed before the animal is rising three years old. It is not so common in the mare; but big, heavy cart-horses are much affected, more particularly in their hind extremities. When the fore-limbs are attacked, the symptoms are of a trembling character, and are best observed while the animal is eating a feed of oats, when the muscles of the shoulders and legs are noticed to be all in a quiver. In other cases, on the horse being put back, it drags its fore-feet on the heels, after the manner of one suffering from acute founder. The drinking of cold water, in suspected cases, usually provokes the nervous twitchings and tremblings above referred to.

599. **Chorea.**—I have seen a horse, rising three years old, suddenly attacked with acute chorea when at work in the plough. It would stop, and fall on to its head or side, and sometimes come over backwards; on rising it seemed to have little or no control over the muscles of the limbs, having both fore and hind legs spread wide apart to keep it from falling, while the head, hanging in a listless manner, was swung from side to side. In these cases, if made to stir, the animal staggers and falls, or steadies itself against a wall, the attack resembling very much that of lightning shock. As the case proceeds, should the patient be turned out to grass, and be made to trot or canter, it pulls the legs up very high, in a jerky fashion. When stopped suddenly, it may perhaps fall on to its head or shoulder, and go tail over head; or the fore-feet may be planted forward like posts, the body swinging from side to side. These cases never sufficiently recover to be of much service in saddle or harness, but may do ploughing and harrowing

fairly well. Two-drachm doses of bromide of potassium, and 2 scruples of exsiccated sulphate of iron, given daily, followed up with 1-drachm doses of nux vomica, are very beneficial in such cases.

600. **Shivering**, although varying very much in degree, is sometimes readily noticed when the animal is standing in the stable, for, on being made to move over from one side of the stall to the other, the tail is suddenly jerked upwards and quivers, while the great muscles of the thighs and quarters assume a rigid condition. On putting the animal back, the hind-legs are moved in a stiff, straddling manner, the animal backing with great difficulty. Horses thus affected, when in the stall, always stand stretched out, with the hind-legs back, and the point of the toe in the channel.

601. **Stringhalt** is known by a sudden, spasmodic clicking up of one or both hind-legs. It is, at times, seen when the animal is turned quickly round, or if made to stand perfectly still, and then walked smartly forward, when it is *noticed at the first step*. It is also exhibited when forcibly backed or excited, but slight cases are difficult to detect, as the clicking action is not always noticeable, the horse only showing the peculiar action at irregular intervals. Cases have been known where horses have been bred and worked on the farm until they were five or six years old; they have then been 'made up,' and sold at public auctions without any unsoundness being manifested, but after having been put on rail, and taken out at the end of the journey, they have been found to be confirmed cases of stringhalt or shivers. Whether this is due to fright on being railed for the first time, or from the jerking they get in the horse-box while shunting at the stations, is questionable, but it is a matter of great moment to both buyer and seller. It is needless to add that animals affected with these nervous disorders are classed as unsound; yet they can work for years, and carry very heavy loads *forward*, but have great difficulty in backing.

602. **Dogs** also suffer very much from chorea, it being a frequent sequel to distemper (*par. 532*). In such cases Fellows' compound

syrup of hypophosphites or Easton's syrup can be used with beneficial effect.

603. **Spinitis** is inflammation of the spinal cord and its coverings. This may occur in an *acute* or *chronic* form, but either is very rare. It may also arise from rheumatic affections, and injury to the back-bone from concussion, etc: In the acute form the animal is suddenly attacked, showing great pain, and perspiring freely. It throws itself down, rising again with great difficulty, and strong muscular contortions are evident—in fact, the symptoms resemble an acute attack of inflammation of the bowels, or azoturia. *Treatment*.—Nerve sedatives, such as chloral hydrate, belladonna, or hypodermic injections of morphia, along with a good dose of opening medicine, such as linseed or castor oil, should be given. Hot-water blankets should be applied constantly to the back, and the rectum must be emptied by the hand, and the urine drawn off by the catheter. From the effusion which takes place in the spinal canal, the cases usually terminate fatally, or, at least, in paralysis.

604. **Paralysis, or Stroke**.—This may be described as *complete*, *partial*, *local*, or *reflex*, and is a sudden loss of power, either with or without sensation. It may, however, come on gradually. *Hemiplegia* is the term employed when only one side of the body is attacked, and *paraplegia* when either the fore or hind part of the body is affected.

605. **Complete Paralysis** is the term employed when motion and sensation throughout the body are suddenly arrested, as in milk fever, stomach staggers, acute lead-poisoning, etc.

606. **Partial Paralysis** is a term used when only part of the body is affected.

607. **Local Paralysis** means that only some of the muscles are involved. This form is frequently seen after influenza, strangles, and lightning shocks, when the muscles of the head and lips of the affected side hang loose and pendulous, the tongue also sometimes suffering. The animal, on getting food into its mouth, has no

power to roll it for mastication. In these cases the food has to be removed by the hand.

608. **Reflex Paralysis.**—This may arise from impaction of the stomach and bowels of both cattle and horses. It is also caused by pressure and obstruction in the urinary and generative organs. Cattle will sometimes lie for four or five weeks before calving, without having the power to rise, and, after parturition, get up without any assistance.

609. Seeing that there are so many different causes, it is highly important to call in professional aid at the very beginning, and have the animal treated accordingly.

610. **Lightning Shock.**—In the majority of cases lightning shock affects the nervous system, more particularly the motory nerves, causing total or partial paralysis, while the sensory nerves become more acute. When one side is affected, the animal carries its head to one side, and has a very unsteady gate, staggering from side to side, while the muscles on the side of the face affected become pendulous and swollen, or the neck may be so affected that the animal cannot eat from the ground. The shock, however, may be such that the animal loses the use of its limbs, and cannot get up; yet it can feed well, and, if a cow, chew the cud. These various symptoms may be noticed, but no external marks are visible. When, however, the electric current strikes the body, the skin and hair have the appearance of having had a red-hot iron run over them, while under the skin the tissues are jelly-like, and full of effused material. In most cases of death from lightning the blood remains fluid, and the muscles of the body do not stiffen, but are flabby and soft, and readily decompose.

611. **Rabies.**—This frightful malady, although formerly described as an affection of the nervous system, is now considered to be due to the action of a specific microbe, which gains entrance to the system. Of all the animals that are subject to its baneful influence, those of the dog tribe seem to be most prone. In some cases the



patient has a great horror of water, the sight of which brings on a peculiar tetanic spasm of the gullet, causing inability to swallow—hence the name hydrophobia. This symptom is, however, more noticed in the human subject than in the lower animals, as a rabid dog will, at times, go into the water, if in its way, and lap it freely. It is generally thought that extremely hot weather favours its occurrence; but, as previously stated, it depends upon the introduction of the disease-producing germ into the system. This is generally accomplished by means of a bite from a rabid animal, but accidental inoculation may take place through an abrasion or sore on the skin being licked by the tongue of an affected animal. It has been observed that, from the introduction of the germ into the body to the period at which the malady is made manifest, the time varies to a great extent. In some cases only a few days elapse, while in others months, and even years, intervene.

612. *Symptoms.*—In this, as in most affections of the brain and nervous system, the first thing noticeable, particularly in the dog, is great dullness, accompanied by periods of excitement that are without apparent cause. An affected dog has a tendency to eat all sorts of rubbish, dirt, feathers, leather, etc. It snaps and bites at anything which may come in its path, but will not go out of its way to do so. Again, the nature of the animal is quite changed. If it has previously been very mild and docile, it will become quite irritable, and inclined to bite its best friend, and *vice versa*. It also has a tendency to go off by itself, going with a peculiar lounging, swinging gait, taking little or no notice of anything unless interfered with. The head and ears hang in a limp, loose fashion. It foams at the mouth, and its eyes are bloodshot, with a peculiar sullen, far-off look. The bark or howl of a rabid dog, once heard, is never forgotten. If the animal is not destroyed, death is generally preceded by convulsions and paralysis. On account of the great danger following in the wake of a rabid animal, it should be destroyed immediately the fact that the disease is rabies has been established. Directly a bite is inflicted the parts ought to be well washed with a mixture made of 1 part carbolic acid and 4 parts water, or it should be dressed with tincture of iron. The

wound may be cauterized, and caustics in solution answer best, as they get well into the bottom of the wound; solid caustics are not so reliable.

613. Pasteur, the great French scientist, who, for a number of years, devoted a great amount of time and ability to conducting experiments, in order to find a preventive for this direful scourge, at last found that portions of the spinal cord of rabbits, which he had previously rendered rabid by inoculating with the *virus*, could be attenuated to a variety of strengths. When these preparations of the virus of rabies are injected daily into the body of a patient that has had the misfortune to be bitten by a rabid animal, the body is said to be rendered immune from the disease. The success which has attended this treatment, and the large number of cases that have been inoculated, almost render it imperative that no time should be lost in placing a bitten subject under the Pasteur treatment. The idea that underlies treatment by inoculation is to bring the structures of the body into such a condition that the rabid virus fails to find suitable food for its development and multiplication. In this way, though the germ has been introduced into the body, the disease may be prevented. Fortunately, owing to the general enforcement of the muzzling order for dogs, this country has been practically free for some time past from this distressing malady. Rabies is a scheduled disease under the Contagious Diseases (Animals) Act.

614. **Tetanus, or Lock-Jaw.**—This is a malady that is characterized by a continuous, stretched, tense, and rigid condition of certain voluntary muscles of the body. It is of a fearfully fatal nature, and, in some cases, in its acute and later stages, simulates *rabies*. Until very lately, it also was described as an affection of the nervous system; but it is now said to be due to a germ termed the *drum-stick bacillus*, so called from its resemblance to a drum-stick. Tetanus is of common occurrence in the horse, more particularly in hot climates, and is met with in three forms, *acute*, *subacute*, and *chronic*, the first being the most fatal. It was formerly classified under two heads, and, when no cause could be found, it was called

*idiopathic* tetanus: the other, arising from a wound with an external opening, was termed *traumatic* tetanus. Now, when no wound can be observed, it is supposed that the bacillus finds its way into some lesion in the lining membrane of the alimentary tract, where it can establish its action.

615. Tetanus commonly follows wounds in the extremities, particularly punctured wounds in the feet (the majority of my cases have resulted from these). At times it also supervenes on operations, such as castration, docking, etc., no matter how skilfully they may be performed. Experimental microscopists tell us that the disease-producing germ is found in garden mould, and that tetanus can be produced by inoculation with such soil. This appears to me to be a strange conclusion, as it is a very common practice of mine, on seeing a wound showing signs of healing, to leave it exposed to the action of the air, and to order *fine dry soil* to be dusted over the raw surface. The soil I find to be a good absorbent and deodorizer, and, as a rule, the wound heals quickly. I cannot call to mind a single case of tetanus following this treatment. There, however, must be something either in the air, surface soil, or temperature, to account for this disease, as, during a period of fifty years, only one case of tetanus in the horse at the bottom of one of the many coal-mines visited has come under my own observation; yet, as a rule, the principal portion of the cases met with in the pit-bottom are wounds in the feet.

616. There are three terms used to designate the varieties of tetanus, viz.: (1) *Opisthotonos*—when the head is pulled upwards and backwards, and the tail is raised by the tense contraction of the muscles of the back; (2) *emprothotonos*—when the head is depressed and pulled down; and (3) *pleurosthotonos*—when the head is drawn to one side. The first form is mostly observed in the horse, but the last two I have never seen in the horse, though I have noticed them in the human subject.

617. Tetanus generally makes itself manifest from about the sixth to the tenth day after an accident or operation, just when the wound

is healing. Should infection have taken place, if the wound is closely examined, it will be observed to have a peculiar dusky copper colour, and not that bright strawberry-red seen in healthy granulations. The organism, or bacillus, supposed to cause the malady is said to confine itself to the wound and its immediate surroundings, and it excretes or manufactures a material which, being absorbed into the tissues, acts upon the nervous structures

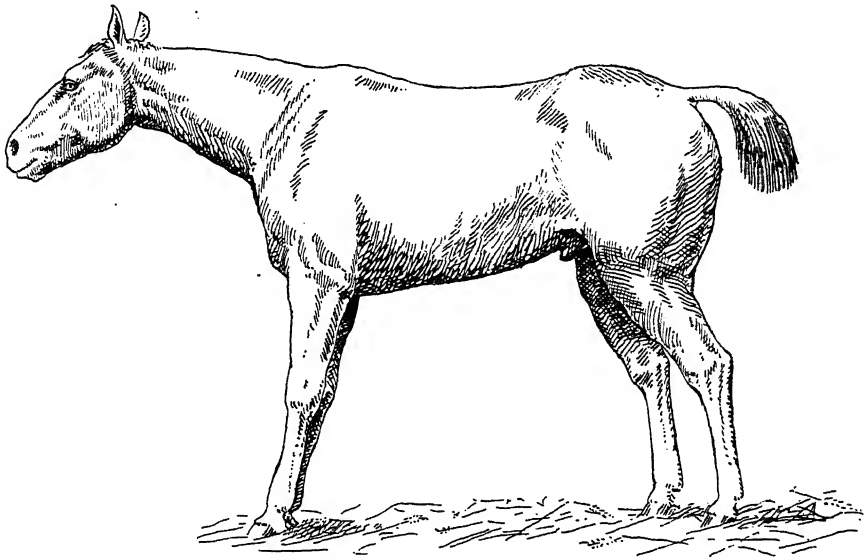


FIG. 15.—TETANUS.

and produces the disease. With reference to these disease-producing germs, spores, microbes or bacilli—in other words, the seeds of the disease—they have, for some time past, been experimented with by a number of microscopists in the laboratory, and there cultivated, grown, and tested with suitable food (medium), air, moisture, and temperature. Their specific nature has been determined by inoculation, according to the particular disease to which they belong; but when such a disease appears in the farmyard, or in the sheep-fold, there seems to be something else wanting besides the conditions

formulated in the laboratory. It has been observed that some of these specific germs, like the germ of wheat or of other grain, retain their vitality for a considerable time in a dry condition, and that they are ever present with us in air, water, and food. Now, if they are so ready to establish their action when cultivated in the laboratory, all conditions being suitable, how does it happen that the various specific diseases these germs are said to produce are not ever present, and that all animal life has not been destroyed? Probably it is because, like seeds of higher organisms of every kind, the surroundings must be replete and complete with every necessary condition favourable to their germination and development; or it may be essential that, through some peculiarity in the atmosphere, locality, food, or other influences, acting either collectively or separately, the body of the patient must first be brought into such a condition that the particular germ specific to the malady, which has been lying latent, finds the circumstances suitable for germination and growth.

618. *Symptoms*.—Tetanus in a mild form is not readily detected, but in its acute stages the symptoms are more prominent. The first to be noticed are that, if the animal is made to walk, it moves stiffly, and with a wooden gait; the head is extended forward, nose pointed out, ears pricked out in front; there is straddling of the hind-legs, the hocks of which are turned out, and the tail is raised and shaking. If the animal is in the stall, the hind-legs are placed backwards, wide apart, with the points of the hocks turned out, the tail elevated and quivering, the head pulled up, and the eye very watchful; whilst the slightest noise seems to aggravate the symptoms. On approaching the head, the animal recedes and drags the fore-feet backwards, raising the head higher; the eye-ball is drawn back into the socket, and the haw (*membrana nictitans*) is stretched across the front of the eye, giving it the peculiar appearance of a squint. The latter is looked upon as a confirming symptom, yet the jaws may still be slightly movable. But, as the case proceeds, the symptoms become more pronounced; the muscles of the face have a tense, pinched appearance; the nostrils are wide open, and there is foam-

ing at the mouth. If the animal is made to move round, it turns like a solid block, with its fore-legs wide apart. Patches of perspiration are noticed on various parts of the body, and, in some cases, it sweats profusely all over. At first the pulse is not much affected, but finally becomes quick, hard, and oppressed. The moment the animal ceases to breathe all the muscles of the body become relaxed, soft, and flabby.

619. *Treatment*.—Having seen a large number of cases, various modes of treatment have come under my notice, such as bleeding, physicking, hot fomentations, applying a newly flayed sheep's skin or heavy woollen rugs to the body; giving prussic acid, belladonna, aconite, chloroform, chloral hydrate, bromide of potassium, opium, etc., recovery being sometimes attributed to one thing and sometimes to another. I have also tried hypodermic injections of the various serums and antitoxins without obtaining any beneficial results. My greatest success, however, has been in getting the affected animal into a quiet, secluded, well-ventilated loose-box, and supporting it with slings to keep it from falling; for if it once gets down, it very rarely gets on to its legs again without assistance. If called to the case before the jaws become closed, and there is opportunity for giving a dose of medicine, a 6 to 8 drachm dose of physic must be given on the end of a small cane, taking great care not to excite the animal. Sheets and rugs are then to be removed, as they only aggravate the patient; leave the body without any covering, as cold acts as a grand sedative. Cases recover more readily in extremely cold, frosty weather than in hot. If there be an external wound, clip off the hair from about it, and wash well with 1 part of Little's phenyle and 60 parts of cold water; then apply tincture of iron to the wound, and cover it well up with a good plaster of extract of belladonna, over which is spread a thick layer of cotton-wool. Great success has attended this mode of treatment, accompanied by alternate hypodermic injections of pure carbolic acid (B.P.) and glycerine and a mixture of morphia and atropine, 30 to 40 drop doses of each, every six or eight hours, at the same time giving 1 to 2 ounces of

sulphate of magnesia or hyposulphite of soda dissolved in a pail of cold water, cold hay-tea, or milk and water, placed in front of the patient in such a position that it can suck in the fluid at its leisure. Repeat this daily if necessary, and, if required, warm water injections containing 1 to 2 ounces of glycerine can be given three or four times in the twenty-four hours. All solid food should be withheld until the animal is so far convalescent as to be able to assimilate such food; then well-boiled barley and bran are strongly recommended, with green food (if it can be had), carrots, etc. It usually takes from six to eight weeks before recovery can be boasted of. A preparation known as anti-tetanus serum is thought by some to be of great value, both as a remedial and a preventive agent, injected under the skin at the lower portion of the neck.

### THE EYE.

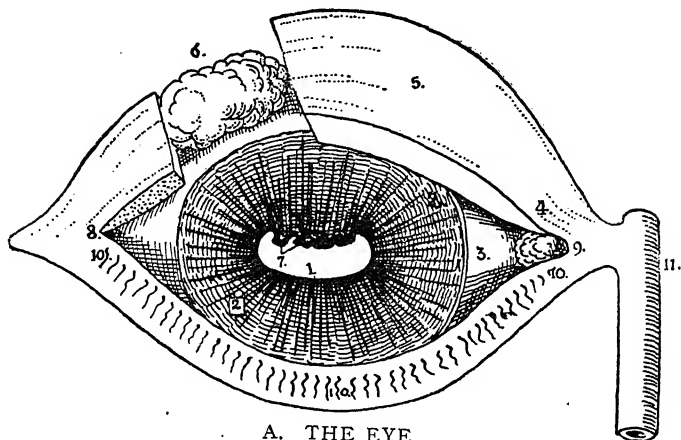
620. **The Eye**, or organ of vision, is of globular shape, and consists of a fibro-membranous sac that contains transparent humours of different densities, which act as refractors. It is attached to its bony socket by various muscles, and sustained in a steady position by a cushion or pad of fat. This pad, in old age, becomes absorbed, and the upper portion of the eye sinks.

621. Protecting the front of the **eye** we have two movable curtains—the upper and lower **eyelids**—the upper being the larger and more movable of the two. The **eyelids** (*Plate XXXIX., A. 5*) are composed of—

1. The *skin*, found externally.
2. *Muscular fibres*, to control their movements.
3. The *tarsal cartilage*, to give stiffness and shape.
4. The *conjunctiva* (*Plate XXXIX., B. 1, 1*), or mucous lining, which is also reflected over the front of the eye, or cornea.

# PLATE XXXIX

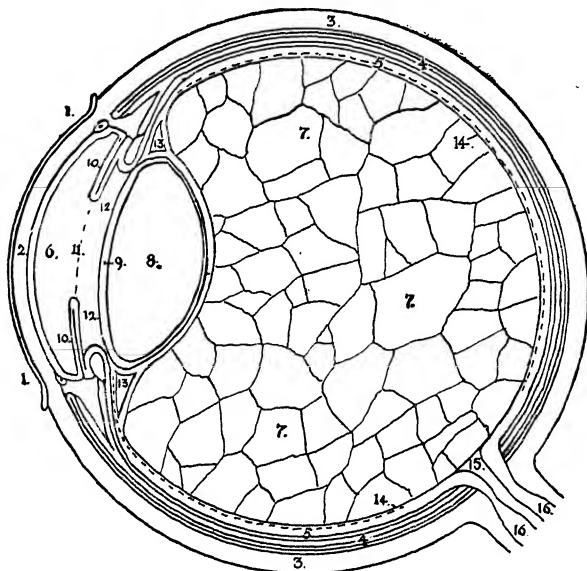
A.



A. THE EYE

1. Pupil. 2, 2. The Iris. 3. Membrana Nictitans or Haw. 4. Puncta Lachrymalis. 5. Upper Lid cut across, shewing 6. Lachrymal Gland. 7. Corpora Nigra. 8. Outer Canthus. 9. Inner Canthus. 10, 10. Meibomian Glands. 11. Lachrymal Canal.

B.



B. SECTION OF THE EYE

- 1, 1. Conjunctiva. 2. The Cornea. 3, 3. Sclerotic Coat. 4, 4. Choroid Coat. 5, 5. Retina. 6. Anterior Division of Aqueous Chamber. 7, 7. Vitreous Humour—Posterior Chamber. 8. Crystalline Lens. 9. Capsule of Crystalline Lens. 10, 10. Iris. 11. Pupillary Space. 12. Posterior Division of Aqueous Chamber. 13. Ciliary Processes. 14. Yellow Spot. 15. Central Artery of Retina. 16, 16. Optic Nerve.



5. The *Meibomian glands* (*Plate XXXIX., A 10 10*), which are found on the margin of the eyelids, and secrete an oily material that prevents them gumming together.
6. The *eyelashes*, which are the fine hairs that are found on the free edges of the eyelids, and are more abundant on the upper lid than the lower, their purpose being to assist in preventing the entrance of foreign bodies.

622. The **Lachrymal Gland** (*Plate XXXIX., A 6*) is situated on the upper portion of the eyeball, and secretes the tears, which keep the front of the eye moist and clear. The tears pass through the **lachrymal duct** into the nose.

623. The **Membrana Nictitans**, or **Haw** (*Plate XXXIX., A 3*), is a cartilaginous structure situated on the inner side of the eyeball. Its function is to remove foreign bodies and shield the eye.

624. The **Eyeball** is composed of three coats, viz.: (1) The **sclerotic** and **cornea**; (2) the **choroid** and **iris**; and (3) the **retina**.

625. The **Sclerotic Coat** (*Plate XXXIX., B 3 3*) is a very dense structure formed of white fibrous tissue, and to it are attached the muscles which move the eyeball. This coat forms four-fifths of the external tunic.

626. The **Cornea** (*Plate XXXIX., B 2*) is that transparent elliptical portion of the external coat situated in the front of the eye. It fits into the sclerotic somewhat similar to the glass in a watch, so forming the remaining fifth of the outer envelope.

627. The **Choroid Coat** (*Plate XXXIX., B 4 4*) consists of three layers—*i.e.*, the external, composed principally of minute veins; middle, a plexus of small arteries; and the internal, a dark brown pigmentary layer.

628. The **Iris** (*Plate XXXIX., A 2 2 and B 10 10*), or curtain, is connected with the choroid, and may be of various colourings. In

the horse it is generally dark brown. The opening in the centre of the iris is called the **pupil**, and in horses is of elliptical shape. The muscular fibres of the iris are arranged in two directions, circular and radiating, the former contracting, the latter dilating the pupil. Some horses have a white, unpigmented iris, and are called 'wall-eyed' or '*albinos*.'

629. **The Corpora Nigra** (*Plate XXXIX., A 7*) are the small black bodies, of a globular shape, to be observed in front of the papillary opening, and generally seen on the upper fringe of the iris. Their use is supposed to be to modify the rays of light.

630. **The Humours** of the eye are the *aqueous*, the *crystalline*, and the *vitreous*. They act as refractive media. The **aqueous** (*Plate XXXIX., B 6 and 12*) is in front, between the interior surface of the cornea and the crystalline lens. It is composed chiefly of water, and has an alkaline reaction. The **crystalline lens** (*Plate XXXIX., B 8*) is bi-convex, more flattened in front than behind. It is made up of concentric layers, like an onion, and is enclosed in a capsule. It is situated behind the iris, having the aqueous humour in front and the vitreous behind, and is held in position by a suspensory ligament. It is transparent, its use being to concentrate the rays of light to a focus. The **vitreous humour** (*Plate XXXIX., B 7 7*) occupies the posterior chamber, which constitutes about four-fifths of the interior of the sac. It is an albuminous semi-fluid of a jelly-like consistency, and is enclosed in a structure termed the *hyaloid membrane*.

631. **The Retina** (*Plate XXXIX., B 5*) is the expansion of the optic nerve. It is composed of several layers, consisting of rods, cones, etc., and is the essential part of the organ of vision. The **optic nerve** (*Plate XXXIX., B 16 16*) enters the eyeball, in company with the *ophthalmic* artery and vein, at the back of the eye.

632. The muscles of the eye are the retractor, abductor, adductor, depressor, levator, and superior and inferior obliques. These muscles turn the eye in the various directions required.

## INJURIES AND DISEASES OF THE EYE.

633. **The Eye**, although well shielded by a strong bony socket, cartilaginous, muscular, and membranous structures, is frequently subject to injury and disease.

634. **The Eyelids** are sometimes injured as a result of fighting, more particularly in dogs. In the horse the upper lid is occasionally torn by hooks, nails, etc. Should the piece hang down over the front of the eye, the best plan is to cut it off, and treat the place as a simple wound, or, if practicable, a suture or two may be put in and the wound covered with collodion. Warty growths, when present, can be removed with the scissors or the knife. The eyelids may become inverted or everted. When the former happens, the eyelashes turn inwards and irritate the front of the eye; when the latter occurs, they turn outwards. Both cases cause much pain and annoyance, and have to be relieved by an operation, which consists of cutting a piece out of the lid. The succeeding inflammation should be treated with the following soothing eye lotion: boracic acid, 1 drachm; wine of opium, 2 drachms; rose-water,  $\frac{1}{2}$  pint; apply with a soft sponge night and morning. If great pain be present, a solution of cocaine or extract of belladonna may be used. The animal should always be kept in a dark place, and fed on a cooling diet.

635. **The Membrana Nictitans**, or **Haw**, a cartilaginous structure in the inner corner of the eye (*Plate XXXIX., A 3*), is sometimes subject to irritation and inflammation, but is more prone to warty growths and soft, spongy, and cancerous tumours. The warts may be successfully cut off with the scissors, but in removing the soft tumours the haw in some cases has to be excised altogether. After the operation the parts should be dressed with the boracic lotion already recommended. These growths are more frequently seen in the cow than in the horse. Old-fashioned farriers used to cut the haw out for an imaginary complaint in pigs, called the 'howks,' which was really indigestion; they took up the haw with a needle and thread and cut it out with the scissors.

636. **Conjunctivitis, or Simple Ophthalmia.**—Inflammation of the external coat of the front of the eye or cornea, extending to the lining of the eyelids. This is generally the result of an injury, such as a blow from a stick or lash from a whip, but extreme hot or cold weather will also produce it, more particularly in sheep and lambs during the cold, frosty spring months. Bad ventilation and drainage also favour its occurrence, but perhaps the most frequent cause is the entrance of foreign bodies, such as sand, hay-seed, chaff, etc. *Symptoms.*—The eyelids are more or less closed and swollen, tears flow freely down the side of the face, and the patient cannot bear exposure to the light. The lining of the lid is very red and congested, and the front of the eye has a peculiar, pale blue, milky hue, especially at the seat of the injury. Constitutional disturbance with fever may in some cases be present, which must receive attention, and be combated with suitable medicines.

637. *Treatment of Simple Ophthalmia.* — A careful and minute examination must be made, and if the cause is due to some foreign body, which is not buried in the exudation that usually follows, it may be removed with a straw, a feather, or the corner of a handkerchief, but a pair of forceps, with fine rounded points, is best. Should the eye be very sensitive and pulled back into the socket, as is often seen in the cow, so that the object cannot be reached, a little of a 5 to 8 per cent. solution of cocaine should be put into the eye, when in the course of from fifteen to twenty minutes the offending body may be removed. On no consideration should alum or powdered glass be blown into the eye, as is too frequently done. These are highly dangerous, and cause a great amount of pain to the animal. They are, therefore, to be strongly condemned. Bathing the eye three or four times a day with cold water, and then applying the boracic eye lotion already named, is all that is necessary. Sheep and lambs, when affected, should be removed to better shelter, and the eye sponged once or twice a day with the boracic lotion. These cases, if not properly attended to, may result in ulceration of the cornea, and even fungoid growths may spring up; then more heroic treatment is required, and touching the places with nitrate of silver every

second or third day has a beneficial effect. In very severe cases the ulceration extends through the external coats; the humour then escapes, and the eye is lost.

638. **Periodic Ophthalmia** (inflammation of the internal structure of the eye) differs very much from simple ophthalmia. Formerly it was supposed to come on with the changes of the moon, and got the name of *moon blindness*, whilst, on account of its tendency to recur, the term 'periodic' was used. It is not so prevalent as it used to be, and when it does occur, town horses, as a rule, are the sufferers. Its causes are not well understood, but are generally considered to be of a constitutional character; sudden changes from heat to cold, bad ventilation, and defective drainage are also blamed. In my opinion, one great cause is through an injury brought about by the horse throwing up its head, in a low-roofed stable, and thus hitting itself behind the ears, or it may arise through the infliction of a brutal blow from a stick in that region. Some think it has a hereditary tendency; such, however, has not been my experience. *Symptoms.*—As a rule, the attack is sudden, the horse is very dull, hangs its head, and has one or both eyelids closed; the upper lid has a flat and wrinkled appearance, owing to the eye being pulled back into its socket. The animal cannot bear the light, and, on examining the eye, it is found to be dim, having lost its lustre, the front chamber appearing of a yellowish amber, sometimes a reddish-brown colour, and the pupil can scarcely be seen. Frequent attacks implicate the crystalline lens, and finally end in cataract.

639. *Treatment.*—Put the animal into a roomy, well-ventilated, but darkened loose-box, keep it perfectly quiet, and administer mild doses of laxative medicine, say 2 ounces Epsom salts and  $\frac{1}{2}$  ounce cream of tartar, night and morning, in a mash of bran, or as a draught, until the bowels show relaxation. The eye should be sponged with a weak solution of extract of belladonna two or three times a day. This treatment, in some cases, may be all that is required, but in protracted cases I have found great benefit arise from the application of a blister on the side of the cheek or behind the ears. I have had cases in bulls, especially young ones, where

the aqueous humour has been rendered opaque—in fact, nearly milky white—from excessive sexual exertion. The animal must not be used in the meantime, but be kept perfectly quiet in a dark loose-box, and the eyes bathed for fifteen to twenty minutes several times a day with cold water.

640. **Cataract** is a pearly white appearance, or opacity, of the crystalline lens, or its capsule, or both. It may result from external injury to the eye, or from frequent attacks of inflammation, or periodic ophthalmia; again, it may be congenital, and appear in one or both eyes. The whole, or only part of the lens may be affected, and various names are accordingly given to it, such as *lenticular cataract*—when the lens itself is the seat of the affection; *capsular cataract*—when only the capsule is affected; and *capsulo-lenticular*—when both are implicated. Old dogs seem to be the greatest sufferers, and in these it generally comes on gradually. In the human subject the lens can be removed and suitable glasses substituted, but in the domestic animals treatment is of little use. When the eye is injured, or undergoing severe inflammation, the great point is to use every endeavour to prevent a cataract forming.

641. In examinations of horses for soundness, it is of the greatest importance that the eyes be carefully examined, as cataract causes partial or complete blindness. The horse must be taken into a dark place, and the eye examined with a lighted candle; if the eye is correct, the pupil will contract gradually on the light being presented, a clear, deep, black-blue, liquid appearance will be seen beyond the pupillary space, and the image of the light from the candle be reflected in three distinct places. On moving the candle to and fro, the reflected lights move at the same time; but if cataract be present, the pupil remains stationary, and a pearly white substance is seen, filling up the pupillary opening.

642. **Amaurosis**, or glass-eye—blindness without any visible cause—is, strictly speaking, not a disease of the eye itself, but a derangement of the 'optic nerve,' producing partial or complete loss of sight. The eye appears to be fuller, brighter, and more brilliant

than usual, and at the first glance it seems a beautifully developed eye. When it occurs, both eyes are affected, as a rule. In the majority of cases the horse carries his head well up, and steps very high, in a hesitating, jerky manner. On carefully examining the eye, the pupillary opening is found very much dilated, and instead of being elliptical, it is nearly circular, very little of the iris being seen; whilst on being subjected to the rays of a strong light, the pupil will not contract. Detection of amaurosis is really of more importance in examination for soundness than that of cataract.

643. *Filaria Oculi*, or worm in the eye, is extremely rare in this country, but is frequently seen in hot climates—*e.g.*, India. The parasite is the *Strongylus filaria*, and measures from  $\frac{1}{2}$  to 1 inch long; it is found in the anterior chamber of the eye, where it moves about freely, setting up irritation, and giving to the aqueous humour a peculiar milky hue. It can be successfully removed by casting the horse, and cutting into the eye at the upper edge of the cornea, so liberating the humour, and with it the offending worm.

644. There are several other diseases of the eye, such as *nebula*, *glaucoma*, *staphyloma*, *tuberculosis*, etc., but as they are of rare occurrence, I will not dwell upon them.

645. **Dislocation of the Eyeball**, a displacement of the eyeball, mostly seen in the dog, as a result of fighting. When recently done it is readily reduced, by pressing it carefully back into the socket with the thumbs, pulling the lids forward with a pair of forceps, and keeping it in its place with a bandage and a pad of wet lint. When it has been displaced for some time, and has become swollen and congested, it should be bathed well with tepid water or an infusion of poppy heads; and it may be necessary to slit the eyelids at the outer corner before returning it; then it should be maintained in its place by one or two stitches of antiseptic thread, all being covered with a lint pad made wet with boracic lotion (*par.* 1069, *No. IV.*), and secured in its place with a bandage. In some cases the eyeball is so much damaged that it has to be removed.

### THE EAR.

646. In the horse, the ears should be fine, and well pointed forward, and when at work, should always be on the move, first backward, and then forward, so as to catch sounds. Each ear is made up of three distinct portions—*i.e.*, the *external ear*, the *middle ear*, and the *internal ear*.

647. The **External Ear** is made up of three pieces of cartilage :

1. *Conchal*, which forms the point.
2. *Annular*, ring-shaped at the bottom.
3. *Scutiform*, triangular in form, and which acts as a lever to move the conchal.

These are all covered internally by a fine skin, containing minute glands, which secrete wax, so as to prevent insects and other foreign bodies entering the ear.

648. The **Middle Ear**, or *tympanum*, contains four small bones, named: (1) *Malleus*, or *hammer*; (2) *incus*, or *anvil*; (3) *stapes*, or *stirrup*; (4) *os orbiculare* (the smallest bone in the body).

649. The **Tympanum** cavity is separated from that of the external ear by a thin membrane known as the *membrana tympani*, or drum of the ear. Sound waves produce vibration of this membrane. These vibrations are communicated to the chain of small bones above mentioned, and, by them, to the internal ear. In order that the pressure on the two sides of the *membrana tympani* may be maintained in a uniform condition, the cavity of the *tympanum* is placed in communication with the pharynx by means of a tube, known as the *Eustachian tube*.

650. The **Internal Ear** is very complex. It is called the labyrinth, and is made up of *bony* and *membranous* parts. The bony part contains: (1) *The vestibule*; (2) *semicircular canals*; (3) *cochlea*, or shell. The *membranous part* is contained within the bony portion, and is specially adapted for hearing.



651. The phenomena of hearing are very interesting, and worth reading up. The same may be said regarding the phenomena of sight. Fortunately, we have very few diseases of the ear in horses. They may, however, get torn or wounded, and are prone to warty growths, which must be removed by operation. Sometimes we have a sinus running up the edge of the ear, the bottom of which has been found to contain a small rudimentary tooth.

652. **Canker** is a foetid secretion in the internal parts of the ear, due to inflammation, of a low type, of the lining membrane. Canker in the ear is mostly seen in dogs that have little to do and are over-fed. Heavy-eared dogs, as spaniels and retrievers, seem to be predisposed to it. When affected, the dog holds its head rather to one side, every now and again shaking it and flapping the ears, which it scratches with its feet. On examination, a nasty, foetid discharge is seen in the hollow of the ear. In some cases minute parasites are at times found infesting the ear, and cause similar symptoms. *Treatment.*—Washing with warm water seems to aggravate and extend the disease. Wipe the affected part as clean as possible with medicated cotton-wool, then put a few drops of créosote or oil of cloves into the ear, and rub well in from the outside; but the best and most radical treatment is to puff into the bottom of the ear a small quantity of iodoform every third day, at the same time giving a dose of castor oil and syrup of buckthorn, and changing the diet.

## THE SKIN

653. **The Skin** (*Plate XL., 10*) is a dense, porous, and very sensitive structure, serving to cover and protect the body from external injury. It is composed of two layers—

1. **External—the Cuticle, or Epidermis.**
2. **Internal—the Dermis, True Skin, or Cutis Vera.**

The skin varies in thickness in different parts of the body. It is fine and soft where much motion is required, and dense and thick where the parts are exposed, as the back, shoulders, etc.

654. **The Cuticle, or Epidermis**, is composed principally of scales, which are cast off when done with, like the scales from the body of a fish. It is non-sensitive. The deepest part of the epidermis is known as the **rete mucosum**, and it is to it that the skin owes its colour.

655. **The Cutis Vera** (dermis, or true skin) contains the **sebaceous, fat, or oil glands**, the **sudoriparous or sweat glands**, the **hair and hair follicles**.

656. **The Sebaceous Glands** (*Plate XL., 10 E*) secrete an oil, which pours into the hair follicles for the purpose of lubricating the skin and keeping it and the hair soft.

657. **Sudoriparous or Sweat Glands** (*Plate XL., 10 B*).—It is said that there are about 2,000 pores in 1 square inch of skin for the purpose of perspiration, an action which is both insensible and sensible. The quantity of sweat varies very much, according to the

season, condition of the animal, the work done, etc. About 14 pounds of insensible perspiration are supposed to pass off every twenty-four hours from a horse—*i.e.*, above  $\frac{1}{2}$  pound every hour—showing that the skin is an extensive draining organ. The water excreted by the sweat glands exercises a protective influence over the external surface of the body, and tends to equalize the temperature of the body. **Cleanliness** promotes the secretions of the glands of the skin, as is readily observed in the sleek coats of well-kept animals, such as **hunters, race-horses, army horses**, etc.

658. **Hair** (*Plate XL., 10 C D*).—In the lower animals the body is covered with hair or wool, which differs very much in texture, according to the climate, season, and the breed of animal; and it also varies in this respect on different parts of the body. A hair is said to have a *point, shaft, and root*. The latter swells out into a bulb, and is fixed in the **hair follicle**—a depression in the true skin. The horse casts its coat twice a year, having a summer and a winter covering. Castration when the coat is being shed or cast in some cases tends to make the coat rough.

659. **Clipping in Winter**.—In late autumn, or early winter, the coat of the horse becomes very long and rough. Anyone who has driven a horse in this state must recognize the oppressive effect the long, close coat has on the animal, which begins to puff and blow, needing frequent applications of the whip, while perspiration oozes out of every pore. A horse stabled in this condition takes hours to dry, and, in many cases, when put in thus at night, it will be found in the morning still wet and cold. This necessarily chills the surface of the body, tending to drive the blood from the skin, and to produce congestion of the internal organs, swollen legs, etc. Clipping makes a wonderful change. The horse becomes an entirely different animal, active on its legs, and eager in its movements. The depression has gone, the whip is no longer needed, and any little perspiration which may arise is quickly evaporated. The greatest advantage of all, however, is that, the coat being off, the animal is more easily dressed and cleaned. The surface capillaries

are thus stimulated in their circulation, animal heat sustained, and the internal organs kept free from congestive disorders. From this it will be seen that clipping acts as a splendid tonic, fully equal—in fact, superior—to an extra feed of corn per day.

660. **Hoofs, Horns, and Claws** are appendages pertaining to the skin. The **hoof**, or **horny box**, protects and shields the sensitive parts of the foot, and is secreted by the coronary band (*pars. 167 and 168*). **Horns**, seen on the sides of the forehead of many animals, are modifications of the skin; they differ very much in shape, size, and colour. A horn has a *base, body, and point*, and is secreted by a fine vascular membrane, which covers the **horn core**, and forms a circular pad in connexion with the skin at the base. The rings formed at the base of the cow's horn are looked upon by many as an indication of the age of the animal. The first ring is supposed to make its appearance about the age of three years, a new ring being formed each succeeding year. These rings are often rasped out, and rubbed down with sand-paper and oil, to give the animal a more youthful appearance. The bony projection, or **horn core**, is made up internally of cavities, interspersed with thin beams of bone, which give to it both strength and lightness. **Claws** are formed in a manner analogous to that in which hoofs and horns are produced.

661. **Skin Diseases** are numerous, and of great variety, and may be classed under three heads :

1. Inflammatory.
2. Non-inflammatory.
3. Parasitic.

## INFLAMMATORY DISEASES OF THE SKIN.

662. **Variola Equina**, or **Horse-Pox**, is a specific, vesicular, eruptive, febrile disease of the inflammatory type, happily of rare occurrence in country practice, and, although of a constitutional character, manifestations of the malady are made through the agency

of the skin. *Symptoms*.—The horse hangs its head in a listless manner, and is off its food, while the skin is hot and dry. In the course of a few days small vesicles are noticed cropping up on various parts of the body. Each of these contains a thin fluid, and soon bursts, forming a scab, which in time drops off, leaving a bare spot. The fever has to be combated with gentle saline medicines, but purgatives must be strictly avoided. Doses of from 1 to 2 ounces of Epsom salts and 1 ounce of cream of tartar, given in hay-tea night and morning, are all the treatment that is required. When the skin is very itchy, sponging it frequently with equal parts of Sanitas and water has a very soothing and cooling effect.

663. **Variola Vaccina, or Cow Pox**, is a somewhat similar malady affecting the cow, which, however, is now very rare. It was in the lymph contained in the vesicles of this affection that the immortal JENNER recognized the properties of a protective agent against human **small-pox**, and from this lymph he prepared his vaccine. The vesicles are usually found on the udder of the cow, and accompanying them there is, as in the horse, a considerable amount of fever and constitutional disturbance. Simple alkaline medicine, good nursing, and easily digestible food constitute all the necessary treatment.

664. **Variola Ovina, or Sheep-Pox**.—A vesicular complaint, somewhat analogous in its symptoms to the pox of the horse and cow; also affects the sheep, but is happily very rare. Here the eruptions are first seen on the inside of the thighs and forearms. The affected animals should at once be removed and isolated. Sheep-pox is under the Contagious Diseases (Animals) Act.

665. **Simple Eczema** is an inflammatory eruption of the skin, which often affects the horse when at grass, particularly in the spring and summer months. It is characterized by the formation on various parts of the body of minute vesicles or bladders full of a thin fluid, accompanied by itching and irritation, which cause the animal to rub itself against anything it comes in contact with. It is common in horses imported from other countries, and somewhat resembles mange, but in this case there is no parasite present. Being very

inoculative to other animals, all harness, clothing, saddles, brushes, etc., used on an affected animal must be carefully washed in some disinfectant fluid. Although the complaint is distinctly inflammatory, there is seldom any accompanying constitutional disturbance, and the first thing to be noticed is that the hair stands up on end in minute patches, which, on closer examination, are found to denote the presence of small pustules containing fluid. These soon dry up, forming scabs, which, if brushed off, leave bare places. If taken in time, washing the body with Jeyes' fluid or Little's phenyle---  
r part to 80 parts cold soft water—every three or four days, and giving tablespoonful doses of bicarbonate of soda every night and morning in a mash, has a very good effect. Chronic cases, however, have to be dealt with by stronger treatment, such as arsenical preparations internally and iodine applications externally.

666. **Mallenders** is of an **eczematous** nature, and may be regarded as a subacute or chronic inflammation of the skin at the back of the knee-joint, with a thin, irritative, watery discharge, causing the hair to stick out and eventually fall off, leaving a scurfy thickening of the skin. It is a complaint common in cart-horses, especially when they are out of condition, notably those that have thick, gummy legs. *Treatment* is not always satisfactory. The general condition of the animal must have attention, the diet must be changed, and a mild, laxative ball given (say, 3 drachms each of aloes and bicarbonate of soda), followed up by tonic diuretic medicines, and dressing of the parts twice a week with a little 10 per cent. oleate of mercury; which should be well rubbed in. Of all the remedies I have tried, this application seems to have the best effect. On no account should the affected parts be washed, as this seems to irritate them and to encourage the spreading of the complaint.

667. **Sallenders** is a complaint identical with *mallenders*; the only difference is in the situation, this being found at the front and bend of the hock. **Lichen** is a somewhat similar complaint, but more of a papular form, and affects the skin on the back part of the legs. Old chronic cases are known as 'rat tails.' *Treatment* for these is the same as that laid down for *mallenders*.

**Grease** is inflammation of the true skin, of an **eczematous** affecting the oil glands, and, strange to say, in this part of nearly all cases of sudden lameness and swollen legs are as 'shots of grease,' whereas in reality no such thing. **Art-horses** of the round, gummy-legged class are more than those of the light-legged class, while the hind-legs often attacked than the fore. The causes are various. **Horses** have a natural predisposition to it, and then anything on the lower part of the limb will induce the disease. **Ills** after the animal has been heated; washing and not legs; want of exercise, with too stimulating food; feeding on **oats**; standing in filthy boxes, etc., all have a tendency to this complaint. *Symptoms.*—The first symptoms usually swelling of the legs and stiffness on moving, but there is **acute** pain present which is characteristic of 'weed,' often **grease** (*par.* 451). In a short time the hair stands on **thin**, yellow, oily discharge is seen oozing through the **runs** down the limb, and irritates the parts with which **contact**. The leg is very painful to the touch, and in the **heel** and back of the fetlock cracks are seen in the **treatment**.—The alkaline laxative ball, mentioned under **should** be given, followed up with saline and iron tonics. **ould** be washed with Little's phenyle (1 part to 80 parts), then a hay bandage rolled round the limb, and the **ash** poured down it five or six times a day. This can **ed** for thirty-six or forty hours. The after-treatment **ends** on the progress of the case.

**Warty warts.**—Grease often ends in the formation of trouble-looking outgrowths round the pastern joint, resembling a **clump** of grapes, from which there is a nasty foetid discharge. In **the** phenyle wash should be made stronger (say 1 in 40), **the** parts are dry they should be dressed with powdered **vitriol**. Burning off the warty excrescences with a hot **times** necessary.

**1d Fever**—a form of erythema, or superficial, patchy,

inflammatory eruption of the skin, affecting more particularly the legs of clipped horses, but it may also affect any other part of the body splashed with mud. It is most common in winter-time, when the weather is very changeable—*e.g.*, hard frosts being suddenly followed by thaws and sloppy weather, and *vice versa*. It is due to the wet mud having been allowed to dry on the skin, and then washing it off on coming into the stable at night, without drying the legs afterwards. Washing seems to irritate the parts, and it is much better to allow the mud to dry on, and then clean it off gently with a soft wisp of meadow hay. *Symptoms.*—The first thing to be noticed is the swelling of the legs; the animal appears stiff, and is not inclined to move; the hair sticks up in patches, and in the course of a few days comes off very readily when rubbed. The legs usually suffer most, but cases occur in which the whole body is more or less affected. *Treatment.*—When any constitutional fever is present, put the animal into a good, roomy loose-box, and clothe it well; the legs, however, must not be bandaged, but kept perfectly dry. The aloes and soda ball, as recommended (*par.* 666), may be given with great advantage, followed up with some suitable alkaline alterative medicine. Should the legs be very much swollen and painful, they may be bathed for about thirty minutes with warm water, then immediately dressed with the following lotion: Sugar of lead,  $\frac{1}{2}$  ounce; Fuller's earth, 2 ounces; add water up to 1 quart; to be applied with a piece of sponge. Well-boiled barley and bran mashes form the best diet. All oils and greasy dressings are to be strictly avoided, but if the heels are very much cracked, a little vaseline may be applied. As a preventive, the legs of carriage-horses and hunters should never be clipped.

671. **Cracked Heels** is a form of **eczema**, and consists of inflammation of the skin and sebaceous or oil glands in the hollow of the heels, particularly those of the hind-legs. The cause may be want of condition, through feeding the animal on unseasoned hay or corn; washing and not drying the legs thoroughly; clipping the hair out of the hollow of the heels; and standing in filthy stalls or boxes. Horses with white legs suffer most, possibly from the extra washing



that they require. *Symptoms.*—The animal is seen to go stiff and sore on first leaving the stable; it may even click up the affected leg like a horse in string-halt, and go on the toe for a step or two, but generally improves in action after going a short distance. The pastern joint is found to be swollen and painful, and there is soon a breaking out in the hollow of the heel, with a bloody discharge. *Treatment.*—Should there be much pain and fever present, then the soda and aloes ball (*par. 666*) should be given, and a poultice applied to the affected heel. This latter can be most effectually accomplished by pulling a piece of the leg of a pair of old trousers over the foot, securing it round the top of the hoof by means of a strap; next the hollow of the heel should be filled in with bran and linseed meal, mixed with cold water to the consistence of porridge, to which should be added a tablespoonful of carbolic acid or phenyle; then the bag should be fastened above the pastern joint, with a bandage over all. After the inflammation is reduced, the following lotion should be applied night and morning, viz.: 2 drachms each of sugar of lead and sulphate of zinc, mixed in a quart of cold water (*par. 1060, No. V.*). In chronic cases of cracked heels, when there is little or no swelling present, dressing them with carbolized zinc ointment usually sets things right in a short time; they should never be washed or rubbed with a cloth; and any mud on them should be left until it dries, when it can be gently rubbed off with a wisp of meadow hay. If neglected, cracked heels may ultimately terminate in troublesome 'grapey' heels, or 'grapes' (*par. 669*).

**672. Mechanical Injuries to the Skin.**—Chafing of the shoulder and back from badly-fitting collars or saddles, produce, respectively, **sore shoulders** and **saddle-galls**. These must have immediate attention, and the cause removed. The sores should be bathed with clean cold water night and morning, and then well covered with Fuller's earth. Should the skin be much damaged, dressing with the zinc and lead lotion (*par. 1060, No. V.*) will have a good effect.

**673. Scratches and Pricks** from thorns and barbed wire are very common. When present, the thorns must be carefully removed,

great care being taken not to break them in under the skin, as they very frequently cause a great deal of fever and pain, more particularly when in the neighbourhood of a joint (*par. 133*). When the parts are much swollen and painful, bandages that have been wrung out of cold water should be applied when practicable, and kept constantly wet till the pain and inflammation have abated, after which dressing the parts with the zinc and lead lotion is all that is required.

674. **Burns and Scalds** may be very slight or very severe; in many cases they cause death, from the extremely exhausting nerve-irritation or shock. The great point to be observed in the treatment is to exclude all air from the affected surface with any suitable medium which is at hand. For this purpose nothing is handier nor better than a thick coating of treacle, over which a quantity of cotton-wool, tow, or sheep's wool, should be placed, and secured with bandages. If treacle is not available, a pailful of good thick clay and water may be mixed and applied over the damaged surface with a whitewash brush, repeating the application when necessary; this, when it has dried on, gives a great protection from the air. Any febrile symptoms which may arise must be treated by means of cooling and soothing medicines, but on no account must purgatives be used. Should the bowels be irregular, small doses (say 5 to 8 ounces) of linseed oil, repeated every eight or ten hours, will be found to be very serviceable. Food of a light and digestible nature ought also to be given. When the fever and acute symptoms abate, the raw surfaces of the wounds should be dressed with the zinc and lead lotion (*par. 1060, No. V.*). Two very severe cases in the horse have occurred in my practice, both of which seemed to go on well for fifteen or twenty days, when unfavourable symptoms suddenly set in, and the animals died. In both cases *post-mortem* examination revealed ulceration of the stomach at the pyloric opening into the intestines.

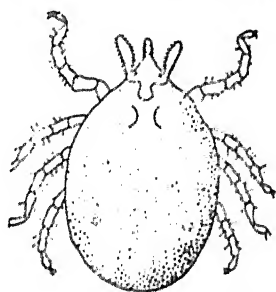
## NON-INFLAMMATORY DISEASES OF THE SKIN.

675. **Warts, Wens, or Angle-Berries**, are abnormal growths, or enlargements of the scales of the outer layer of the skin, of a non-inflammatory character, and to which some breeds of animals are predisposed. They usually occur on the soft thin parts of the skin, such as the nose, sheath, thighs, etc. Sometimes they are well defined, with broad, thick necks deep through the skin, or are even encased in a sheath, just like the kernel of a nut in the shell. In many cases they become very troublesome, on account of their persistence, growing again with great rapidity after it is thought that they have been successfully removed. Pulling or twisting them off quickly with the fingers usually answers best; at other times, a pair of strong scissors, knife, ecraseur, or hot iron may be used in their removal. A dressing of green tar should be applied to the bare surfaces the day subsequent to the removal of the warts. Warts and tumours are often found on the penis of the horse and bull. These are extremely troublesome, and when large interfere with the act of urination, and in the bull especially with that of serving, after which bleeding often occurs. *Treatment*—In the horse, the penis must be drawn out and washed with some antiseptic, nothing being better than phenyle in the proportion of 1 to 80 of water; the offending growths removed with the knife or scissors, and the wounds dressed with tincture of iron. It may be necessary to cast the animal before operating. In the bull, the penis is difficult to draw out even when the animal is cast. My method of procedure is to allow the bull to raise himself on to a cow's back, when, with a loop in a piece of broad tape held in my left hand, the penis is seized and retained until the warty excrescences have been clipped off, and the parts dressed with tincture of iron. These growths occasionally involve the substance of the organ, and then **amputation** has to be resorted to. The cow also suffers very much from these excrescences, and as they materially affect the health and thriving of the animal, they should be immediately removed.

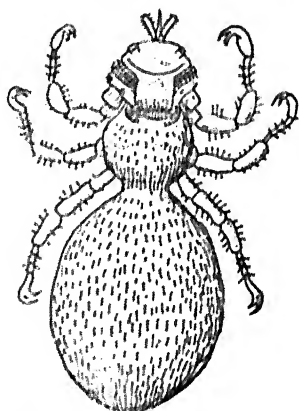
676. **Horn Overgrowths and Injuries.**—The horns sometimes turn and curve in so much that the overgrown points press tightly on the forehead, giving the animal so much pain that it ceases to feed and thrive. Such cases must be attended to, and if necessary, the surplus horn removed with a saw. Again, the horns sometimes stand out with very sharp ends, in which case the points have to be cut off with the saw, or protected with wooden balls, to prevent the goring and wounding of other animals. When the horns are very large, it is found necessary to remove them by an operation termed ‘dishorning’—an operation regarded by many as very objectionable, and looked upon as cruel; but it is not more cruel than to leave them on, and thus enable the larger animals to attack and wound their smaller and weaker companions. As the horn is non-sensitive, and the **horn core** nearly so, as well as being hollow, there is very little pain accompanying the operation. Occasionally a cow may become fixed by the horn, and in endeavouring to liberate itself the horn may be stripped off, without injuring the horn core; when this happens, the parts must be dressed with carbolic oil and tow or cotton wool, and above this should be a layer of tar and tow, all being secured with a light bandage, and fastened to the other horn. When the horn and horn core are fractured, the rough projections and broken fragments of bone must be removed and sawn level, the bleeding stopped with a hot iron, and the parts dressed as above.

677. **Abscesses** are at times met with in the cavities of the horn, arising from an injury done to the parts, and causing extreme constitutional disturbance. The animal breathes quickly and pants, the eyes are injected, perspiration rolls off the body, and the pulse is full and bounding. The most noticeable symptom is that the animal holds the head low and to one side, giving it an occasional shake; if pressure be put on the root of the horn, the animal may bellow out, and fall over on to its side, as if in a fit, rolling its eyes, and breathing in a heavy and spasmodic manner. *Treatment.*—Bore into the base of the horn with a small trephine or a  $\frac{1}{2}$ -inch gimlet, and after the pus has been liberated, roll cold

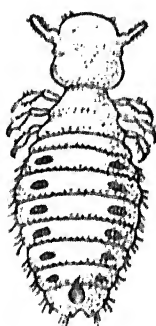
# PLATE XL THE SKIN, AND SOME OF THE PARASITES



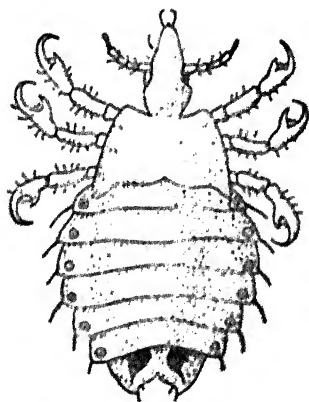
1. Tick, infests Dogs and Sheep, enlarged.



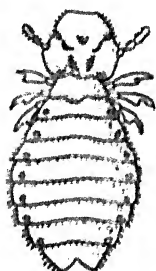
2. Tick, or Ked of Sheep, enlarged.



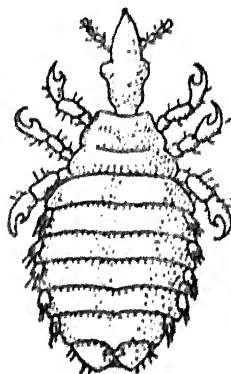
3. Sheep Louse, enlarged.



4. Pig Louse, enlarged.



5. Cow Louse, enlarged.



6. Horse Louse, enlarged.



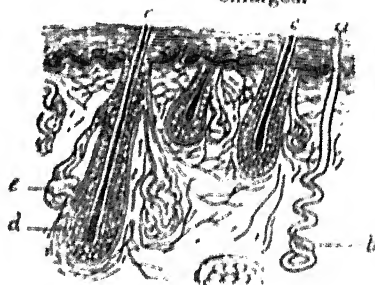
7. Ox Warble Fly.



8. Ox Warble Maggot.



9. Ox Warble Chrysalis.



10. Section of Skin : (a) Duct of Sweat Gland ; (b) Sweat Gland ; (c, c) Hair Follicles ; (d) Hair Bulb ; (e) Sebaceous or Oil Gland.

water bandages round the horn, keeping them constantly moist, and at the same time administer a good dose of purgative medicine.

### PARASITIC DISEASES OF THE SKIN.

678. **Mange or Scab** affects the horse, cow, sheep, dog, cat, etc., and also the human being. This troublesome disease is due to

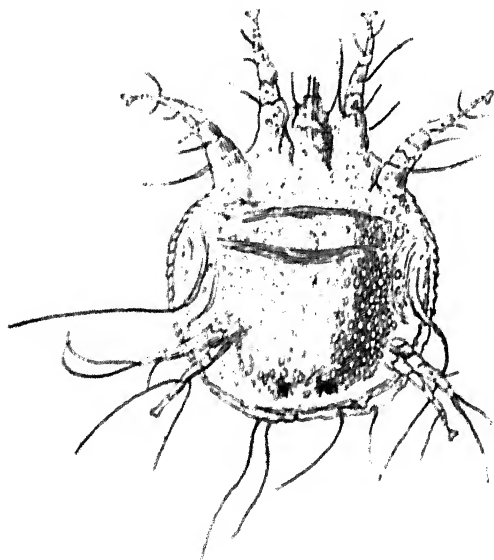


FIG. 16.—MATURE FEMALE ACARUS (BROWN).

the presence of small parasites developed from eggs, which are deposited in vast numbers on or in the skin.

679. These parasites are of three different families—viz. :

1. **Symbiotes**—the parasites that live on the skin.
2. **Dermatodectes**—those boring into the skin.
3. **Sarcoptes**—those burrowing through the skin.

These differ in size and form in the various animals—as may be seen by the illustrations (*Plate XL.*)—and they also differ in a like respect, according to the situation they occupy on the skin of the

various animals. Thus, mange must be considered under the three heads: (1) *Superficial*, (2) *Middle*, and (3) *Deep-seated*. From this fact it may be easily understood how some attacks of mange readily yield to treatment, whilst others verge on the incurable. It is, therefore, necessary to ascertain what class of mange has to be dealt with before suitable treatment can be adopted. Mange usually attacks the horse in the region of the mane, head, and tail, causing much irritation and discomfort to the animal, and when the hook-like appendages on each parasite are considered, it is not a matter for surprise. *Symptoms*.—The animal appears dull, and is much inclined to rub the affected parts whenever it has the chance. Rubbing the fingers gently over the irritated places causes the animal to move the lips and muzzle with an expression of great pleasure. Close examination also shows a number of small papules containing a small quantity of serous fluid, which soon escapes, forming scabs or crusts.

680. *Treatment*.—All animals affected with mange should be carefully isolated, since—as will be quite obvious to all from its parasitic nature—the disease is a highly contagious one. The animal must be carefully washed with some parasiticide. Any of the non-poisonous dips may be used, but dip containing arsenic must not, on any account, be used where the skin is at all excoriated or broken. Jeyes' fluid or Little's phenyle—1 part to 30 or 40 parts of cold water—has a very good effect, and, in bad cases, dressing with a mixture of whale oil, black sulphur, and spirits of tar, may be attended with good results. Iodine preparations are very useful, but nearly every practitioner has his own favourite remedy. The stables, boxes, clothing, harness, etc., used by the infected animals must also be carefully washed and constantly disinfected. For the dog, I think nothing is better than the application of a mild preparation of the green iodide of mercury—say 30 grains to 1 ounce of lard or vaseline. A simple wash can be made by boiling a quantity of foxglove leaves (*digitalis*), which, when cold, should be applied to the parts. Should any constitutional disturbance be present, it must be

attended to, and the bedding, which ought to be of pitch-pine shavings or sawdust, changed every three or four days. Carbolic acid, strong mercurial ointments, or tobacco wash, should never be used on the dog, as these have a dangerously depressing and sickening effect. Scab in sheep is an affection of the skin due to the presence of small parasites, mites or acari, known as *Dermatodectes ovis*, or *Psooptes communis*, and developed from tiny eggs about  $\frac{1}{800}$  part of an inch in length. The female parasite is intensely prolific, lays its eggs and dies. It has been estimated that from the first to the sixth generation, in about the space of ninety days, no less than 1,000,000 female and 500,000 male parasites are born. The complaint is thus extremely contagious. The symptoms are great uneasiness and itchiness of the parts, the sheep continually biting, scratching with the hind-feet, and rubbing against posts or any other object, tufts of wool become pulled out, and the sheep soon have a ragged and dirty appearance. Both the remedy and prevention is to dress the parts with some of the many sheep-dip preparations approved of by the Board of Agriculture and Fisheries; dipping at intervals is also used as a preventive. The complaint is scheduled under the Contagious Diseases (Animals) Act.

68r. **Warbles** (Plate XL., 7, 8, 9).—These are small elevations or tumours about the size of a lady's thimble, found on the backs of cattle between the shoulders and loins. They may vary in number up to fifty or more, and cause great loss, not only in the value of the hides, but to the flesh immediately beneath as well. The tumours contain larvæ, developed from the eggs deposited by the ovipositor of the female **bot fly**, or **ox warble fly** (Plate XL., 7, 8, 9), in the months of July and August, and they make their appearance between the following February and May, or perhaps later. According to the late Miss E. A. Ormerod, LL.D., the **ox warble fly** 'is two-winged, and upwards of  $\frac{1}{2}$  inch in length, and is so marked that it resembles the humble-bee, with a yellowish face, body between the wings, yellowish in front and black behind; abdomen whitish at the base, black at the middle, and orange at the



tip; large head and brown wings, black legs and lighter feet.' There seems to be some difference of opinion as to whether the female fly deposits the eggs on or within the skin, or on some part of the body where the animal can reach with the tongue, so that, in the event of the latter being so, the young embryos, after being hatched from the eggs, are carried by the tongue to the mouth, from whence they find their way to the skin on the back, where they develop into warbles. From my own observation, I do not favour this mode of development; it may be the method, but my own view is, that the peculiar pointed end of the eggs are placed by means of the female ovipositor, which is telescoped, within the outer layer of the skin where the embryos are hatched, and which afterwards bore their way into the true skin, and there develop into the larval form or warble. It is strange that the warbles should only be found on the back of the animals between the top of the shoulders and the loins, a place where the beast can neither lick with the tongue nor lash with the tail, and there is no doubt but that pain is produced when the eggs are deposited, which cause the animals to gallop at a break-neck pace all over the pastures, with tails extended and slightly depressed towards the tip, rushing under the shade of the branches of trees, or into ponds and rivers where their tormentors will not follow, and are thereby left at rest; but it is not until the spring months—as already stated—that the effects are seen, in the shape of the tumours or warbles. Light-coloured animals seem to be more particularly attacked.

682. On examination of the skin on the back, a dark opening can be seen, surrounded by a small quantity of frothy matter. By pressure with the thumbs on each side the larva can be squeezed out. If not interfered with, in due time the slug comes out of its winter shelter of its own accord. This is accomplished by a wriggling motion, for which its peculiar spiral shape—as depicted in the illustration—is specially adapted. It then falls to the ground, and is converted into a chrysalis, and finally into the perfect insect, ready to recommence the cycle of life in the summer months. As warbles

cause a great loss to the farmer, as many as possible should be squeezed out and destroyed. Washing the back of the cow with a strong solution of salt and water before turning it out acts as a good preventive. Smearing the back with turpentine and tar, or carbolic dressings, has a similar effect, as has also the old-fashioned black oil, which is prepared by mixing sulphuric acid, turpentine, and linseed oil in certain proportions (*par. 1060, No IV.*). The best preventive I have found, and which has been used and recommended by me for nearly fifty years, is as follows: Flowers of sulphur, 4 ounces; spirits of tar, 1 gill; and train (whale) oil, 1 quart, well mixed, and a little applied with a brush to the back of the cattle between the top of the shoulders and the loin once a week. This prescription I sent to the late Miss E. A. Ormerod in 1884, which she acknowledged in her report on the warble fly in 1894; and although the mixture has since been recommended by numerous writers, few have acknowledged the source from whence it came. The horse is rarely affected, but when it is, the larvæ cause larger and more diffuse swellings than in the cow. They must at once be pressed out, and the parts dressed with either Jeyes' fluid or Little's phenyle (1 in 30 solution). For further information on this subject, the interesting notes and writings of the late Miss Ormerod will be found in the Royal Agricultural Society's Reports of 1887-88-89, and in her yearly special reports (1894 in particular), all of them being well worth reading.

683. **Ringworm** is due to a micro-fungus—*Trichophyton tonsurans*—infesting the skin of domesticated animals, is very contagious, and communicable to man. It is most commonly seen in winter amongst young cattle folded in courts or boxes. It attacks the face, head, and neck, and gives rise to round patches, devoid of hair, and covered with a greyish-yellow scurf. On many occasions the attendants become badly affected, having acquired it from the infected animals. *Treatment.*—Dressing with a mixture made up of 1 part of creosote and 8 parts of olive oil answers well, as also do preparations of iodine. For persistent cases, solutions of corrosive

sublimate, or sulphate of copper, have good effects, as has also a mixture of spirits of tar, whale oil, and sulphur (*par.* 1071).

684. **Fly Maggots**—the larvæ of the blow-fly—the *Sarcophagus carnaria*; Order, *Diptera*. When sheep are attacked with these pests they are described as being 'fly-blown' or 'struck,' and as many as 20,000 maggots may be produced viviparously by one female fly on one animal. The perfect insect much resembles the common 'blue-bottle,' but has a black speckled abdomen. In close, muggy weather, particularly in the vicinity of plantations, sheep are frequently infested by these grievously troublesome pests, which are deposited in the soft, wet, dirty parts of the body, especially round the base of the tail. When the animal is seen to be affected, it should be got hold of at once, the wool clipped off if necessary, and the parts dressed with the following mixture: Corrosive sublimate, 1 drachm; common salt, 4 drachms, dissolved in 1 pint of cold water; or with Jeyes' fluid or Little's phenyle (1 part in 30 of water).

685. These latter preparations answer well in many cases without clipping off the wool; whilst a bath of 1 part phenyle to 80 or 100 parts of soft water is a capital dressing for fleas on the dog, or ticks (*Plate XL., Nos. 1 and 2*) on the sheep, being safe to use, and also improving the hair and wool.

686. **Lice** (*Plate XL., Nos. 3, 4, 5, 6*).—These troublesome parasites are hatched from tiny eggs, and seem to be of three kinds: (1) Large dark brown; (2) small red-coloured; and (3) yellow. They attack the cow more frequently than the horse, and are chiefly seen during the winter months infesting the stall-fed animal, particularly if in a poor condition—in fact, they seem to be the great friends of poverty. The parts they most frequent are the head, neck, brisket, along the spine, and the root of the tail. The best dressing I have found is  $\frac{1}{2}$  to 1 ounce powdered *stavesacre* put into a quart of boiling water and left to stand for twelve hours. This

quantity is sufficient for one animal, and should be applied to the infested areas, repeating the wash in ten days' or a fortnight's time. A tablespoonful of soft soap added to the mixture improves it very much. Mercurial ointments, arsenical sheep-dips, and tobacco washes, are to be strongly condemned, as I have seen large numbers of cattle poisoned by their use in such cases.

## LECTURE XII

### THE URINARY SYSTEM

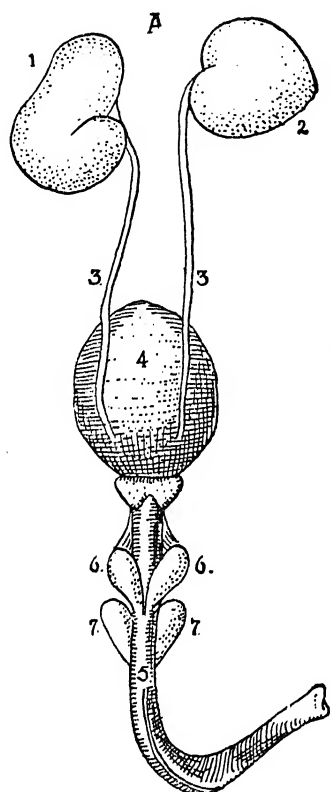
687. THE urinary system consists of the **Kidneys, Ureters, Bladder, and Urethra**, and by these organs the urine is extracted from the blood and expelled from the body.

688. **The Kidneys** (*Plate XVIII., H H, and Plate XLI., A 1 and 2*) are reddish-brown, glandular bodies, situated in the under part of the loins—one on each side of the backbone. They are supported and held in position by their vessels, aided by a quantity of fat—the suet—in which they are embedded. The right one lies a little further forward than the left, being found beneath the two last pairs of ribs. There is a marked difference between the shape of the kidneys in the horse and cow. In the former, the right is shaped like the heart of playing-cards, the left being more like a bean in shape. In the cow they are more elongated and distinctly lobulated.

689. **Structure of the Kidney.**—The organ is made up of tubes (*uriniferous tubes*), bloodvessels, nerves, and connective tissue, the whole being invested by a fibrous capsule. On making a horizontal section of the kidney, it is found to consist of two distinct substances separated by a well-defined line, which is dark in colour, and known as the *boundary layer*. The external portion is known as the *cortex* of the kidney, the most internal part being the *medulla*.

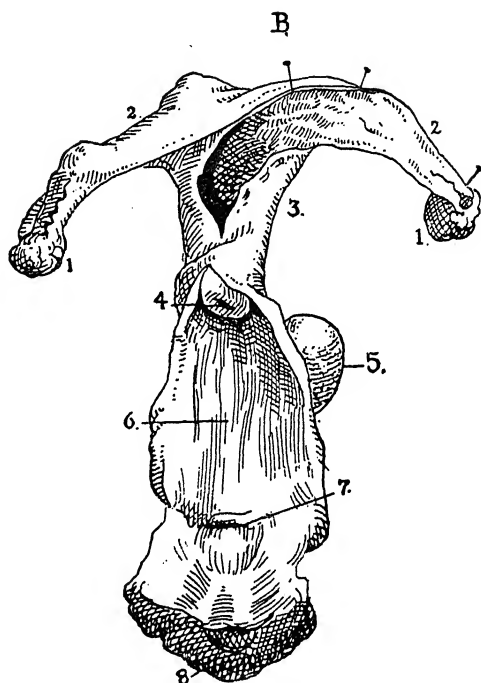
690. **The Cortex.**—On examination, a vast number of little red spots, called the *Malpighian bodies*, are seen; each of these consists of a tuft of capillary bloodvessels (given off from the *renal artery*), enclosed in a membranous capsule known as the *capsule of Bowman*.

# PLATE XLI



A. MALE URINARY AND GENERATIVE ORGANS

- 1. Left Kidney.
- 2. Right Kidney.
- 3, 3. Ureters.
- 4. The Bladder.
- 5. The Urethra.
- 6, 6. The Prostate Gland.
- 7, 7. Cowper's Glands.



B. FEMALE URINARY AND GENERATIVE ORGANS

- 1, 1. The Ovaries.
- 2, 2. The Fallopian Tubes.
- 3. Uterus or Womb.
- 4. Os Uteri, or Neck of the Womb.
- 5. The Bladder.
- 6. The Vagina or Passage laid open.
- 7. Meatus Urinarius, or Neck of Bladder.
- 8. The Clitoris at External Opening.

691. **The Medulla** is paler in colour than the cortex, and on the whole is more dense in its structure. It consists of cone-shaped masses, the points of which are directed towards the centre of the gland, where an irregularly shaped cavity, known as the *pelvis* or *basin* of the kidney, is found. These cone-shaped bodies are, in reality, bundles of uriniferous tubes.

692. Briefly, the urine is secreted by the Malpighian bodies and certain portions of the uriniferous tubes from the arterial blood, supplied by the renal artery; it then passes through these uriniferous tubes into the basin of the kidney, and thence into the ureters, which convey it to the bladder.

693. **Suprarenal Capsules.**—These are two little glandular bodies attached to the front borders of the kidneys; they are ductless, and their use is not well known.

694. **The Ureters** (*Plate XVIII., I I, and Plate XLI., A 3 3*) are two tubes running from the basin of each kidney to the bladder, and, as before stated, their function is to carry the urine from the kidneys to the bladder. They enter the bladder obliquely at the upper and back part, and in this way a kind of valve is formed, by which urine is prevented from flowing back from the bladder into the ureters.

695. **The Bladder** (*Plate XVIII., K, and Plate XLI., A 4, and B 5*) is a musculo-membranous sac or bag found in the pelvic cavity. Its function is to receive and retain the urine until a sufficient quantity has been collected for expulsion. In this way a constant dribble of fluid is avoided. Structurally, it is made up of three coats, and consists of a *fundus*, *body*, and *neck*, and it is held in position by means of ligaments. The bladder, when distended with urine, is pear-shaped, and extends into the abdominal cavity. On the *fundus* a scar or cicatrix is seen, which is all that remains of the *urachus*, the tube by which the urine is carried, by way of the umbilical cord, to the placenta during foetal life. The neck of the bladder passes backwards, and terminates in the urethra.

696. **The Urethra** (*Plate XVIII., P, and Plate A*) tube which, in the male, acts as an excretory duct urinary and generative systems, and is contained within the sheath. In the female, however, it has only one use, and the passage of urine.

697. **Urine.**—This is a fluid which may be either acid or alkaline in its reaction, according to the class of animal from which it is excreted. In herbivorous animals it is alkaline, and has a muddy appearance. The horse excretes, on an average, from 10 to 15 pints of urine per day, but the quantity and quality are greatly altered by various conditions. These are chiefly the quantity of food and work, housing, the drinking of large quantities of water, and the action of certain drugs and medicinal agents, as opium, resin, turpentine, juniper, cantharides, and the various bladders.

## MALE ORGANS OF GENERATION

698. The male organs of generation are the **Testis**, the **Spermatic Cord**, the accessory glands and ducts; the **Penis**, the **Urethra**; the **Inguinal Canals**, the **Scrotum** and the **Prepuce**.

699. **The Testicles** (*Plate XVIII., M M*) are two in number, situated in the scrotum and attached by the upper part of the spermatic cord. The testicles are the organs which secrete the seminal fluid containing the spermatozoa. This fluid is secreted by the testis, and passes through the vas deferens, one of the accessory organs or excretory ducts—the **vas deferens**—to the reservoirs near the neck of the bladder, where it accumulates.

700. **The Spermatic Cords** are two in number, and are composed of various tissues, including bloodvessels, nerves, muscular tissue, and the **vas deferens**, or seminal duct. These cords pass up the inguinal canal and hold the testes in position in the scrotum.

701. **The Accessory Organs** are the *epididymis*, the *vesiculæ seminales*, the *ejaculatory ducts*, the *prostate* and the *bulbourethral glands*.

702. **The Penis** (*Plate XVIII., O*), or external organ of generation, is principally of erectile tissue, and through it runs the urethra.



703. **The Urethra** (*Plate XVIII., P and Plate XLI., A 5*) is a canal or passage which runs from the neck of the bladder to the anterior end of the penis. The urine passes through it, and it also acts as a passage for the transmission of the seminal fluid during the act of copulation.

704. **The Inguinal Canals** are the short passages between the abdominal cavity and the scrotum, and through them the **vas deferens**, bloodvessels, and nerves pass.

705. **The Scrotum** is the purse or sac which holds the testes, and is placed between the thighs, and is made up of a series of layers of integument.

706. **The Sheath** is situated in front of the scrotum, and is a loose fold of skin investing the front and free portion of the penis, and having its anterior end open.

## FEMALE ORGANS OF GENERATION.

707. **The Female Organs of Generation** consist of the **ovaries**—right and left; the two **Fallopian tubes**; the **uterus**, or **womb**; and the **vagina**, or passage communicating externally with the **vulva**.

708. **The Ovaries** (*Plate XLI., B 1, 1*) are situated behind the kidneys in the sublumbar region of the abdomen, and are in connexion with the fimbriated or free ends of the *Fallopian tubes*. They are analogous to the testicles of the male, as in them is formed the ovum or egg, which is the essential reproductive element of the female.

709. **The Fallopian Tubes** (*Plate XLI., B 2, 2*).—These canals run in an irregular manner from the uterus to the ovaries. Their anterior extremities are fringed and free, and their function is to seize and carry the ovum, or egg, to the womb.

710. **The Uterus, or Womb** (*Plate XLI., B 3*), is a musculo-membranous structure, lying partly in the abdominal and partly in

the pelvic cavity. It is sac-shaped, and made up of a body and two horns, and a neck, with an opening known as the *os* (Plate XLI., B 4). It has three coats—viz., (1) external—(2) middle—muscular; (3) internal—mucous. The *middle* or *middle coat* is made up of several sets of fibres, which, by their contraction, assist in expelling the foetus at the time of birth.

711. **The Vagina, or Passage** (Plate XLI., B 6), is composed of two layers, an outer consisting of muscular and connective tissue and an inner of mucous membrane, the latter being arranged in transverse folds, thus enabling the passage to dilate during parturition.

712. **The Vulva**, or external part, made up of two lips, is situated immediately below the *anus*, and is that portion of the generative system presented to view. About 4 inches from the outside on the floor is the opening of the *urethra* (*meatus urinarius*) (Plate XLI., B 7) or duct from the bladder. In the virgin a corrugated fold or doubling of the mucous membrane is found, called the *hymen*.

## URINARY DISEASES.

713. **Nephritis—Inflammation of the Kidneys.**—This occurs in three forms—viz., *acute*, *subacute*, and *chronic*; and generally the two last-named forms are most often seen, though it is an uncommon disease in the domestic animals.

714. **Symptoms.**—At the onset of the acute form in the horse the symptoms very much resemble those of colic, or inflammation of the bowels, only the pain is not nearly so violent; the animal frequently lies down and gets up again, perspires freely, and breathes hurriedly; there is a quick pulse, and a great rise of temperature. When lying, the patient attempts to put its nose on to its loins, and if standing, it constantly stretches into a position to urinate. Small quantities of urine, very highly coloured and occasionally tinged with blood, are passed. I have seen cases where the urine when collected in a vessel and allowed to stand for a time, curdled. In the subacute and chronic stages very little pain is manifested, but the animal is very dull, has a tucked-up

a staring coat, hurried panting breathing, a quick, small pulse, and a high temperature of from  $105^{\circ}$  to  $106^{\circ}$ . If these cases are not early relieved, they may terminate in *uræmic poisoning* (*par. 519*), or in the formation of *abscesses* in one or both kidneys.

715. When only one kidney is affected, as a rule the other has to do the work of both, and becomes **hypertrophied**, or enlarged. During the time the sound kidney is comportsing itself to the double duty all the symptoms of uræmic poisoning are manifested. After a time the abscess in the affected kidney may become encysted, and then the animal appears to get well, doing its work with only one kidney. Again, the abscess may burst, and its contents pass along in the urine to the bladder; there the solid portions of the pus or matter may coagulate, and passing into the urethra, block up the passage, so that the case may end in rupture of the bladder, from the continual strain in attempting to void the urine.

716. The causes of inflammation of the kidneys are various. Some writers hold that the too frequent administration of fancy condition balls and powders, containing potash, balsams, turpentine, resins, etc., is a cause; but if this were so the complaint would be of more frequent occurrence than it is. Bad food, of a mouldy and heated nature, and too severe blisters containing cantharides and turpentine may in some cases be blamed. My own opinion is that sudden chills and exposure to inclement weather—for instance, an animal being caught by a flood and compelled to stand for hours nearly up to the belly in water, or falling into and remaining for some time in a quick mire or deep gutter, where the water rises up over the back and loins—are more often the cause. Cases arising from these latter causes generally prove fatal in from fifteen to twenty-four hours.

717. *Treatment*.—As the complaint is not readily diagnosed, great care should be taken not to administer quack medicines of a turpentine or balsamic character; for, although they may answer in spasmodic colic, they are extremely dangerous in cases of kidney affections. From 15 to 25 ounces of linseed oil, with 2 to 4 ounces

of laudanum, should be given at once, and to relieve the kidneys of some of their work, the skin should be excited by a large hot poultice, made of maize or oatmeal, put into a flannel bag and laid over the loins; or by a blanket, six or eight ply thick, wrung out of hot water and laid over the back, with dry woollen rugs on the top and a waterproof covering over the whole; whilst a good mustard poultice over the loins may also prove beneficial. A newly-flayed sheep-skin may also be tried. Warm water injections should be given every four or six hours, and the legs be well bandaged; while hypodermic injections of *pilocarpine* and *physostigmine* are also very useful. Fly blisters, however, must not be used on any account, as the cantharides and turpentine which enter into their composition act strongly on the kidney; nor should aloes balls be given for the same reason. When the active symptoms have been relieved, easily digested food of a simple character should be offered, such as linseed jelly and milk, or milk and water, and well-bouled barley and bran.

718. **Hypertrophy**, or enlargement, of one or both kidneys is sometimes met with on making *post-mortem* examinations, no indications of such having been observed during life. Some cases are recorded where the kidney has weighed from 50 to 112 pounds. When one kidney is abnormally enlarged, the other is generally **atrophied**, or much smaller than it should be; enlarged kidneys are, as a rule, very soft and flabby.

719. **Calculi**, or **Stones**, are sometimes found in the basin of the kidneys on making dissections after death (*par.* 725). **Melanotic tumours** are also occasionally met with, more particularly in the kidneys of grey horses. **Hæmorrhage** sometimes occurs when a quantity of clotted blood is passed with the urine; but this may result from injury or disease of any part of the urinary system. The *symptoms* of the foregoing diseases of the urinary organs are, however, not well pronounced, and cases have therefore to be diagnosed from negative points.

720. **Polyuria, Diuresis, Diabetes Insipidus, or Profuse Staling**.—In the horse this complaint—considered a dietetic disease

—is characterized by the passing of enormous quantities of urine, and in one case as much as 38 gallons is recorded to have been passed in five hours. Horses in towns seem to suffer more from this malady than those in the country. The cause in many cases is due to bad food, such as mow-burnt hay, or kiln-dried oats, ship-damaged or mouldy corn and beans, or to drinking an excessive quantity of impure water; it also follows debilitating diseases, such as influenza, strangles, etc. *Symptoms.*—The animal attacked loses flesh very fast, is very dull and languid, has the belly tucked up, a staring coat, and shows great weakness, manifested by the plaiting of the hind-legs. The patient also has an unabating thirst, and can scarcely be satisfied with water—I have seen an affected horse go down on to its knees and drink from a filthy gutter—while the appetite is very irregular. There is, further, an almost continuous flow of urine; in some cases the penis hangs pendulous, while clear urine continually dribbles from it, and if not speedily relieved the patient dies from exhaustion or inanition. *Treatment.*—The animal must first be taken off work. Inquire into the quality of the food, and if it be found faulty, change it at once to a good sound nutritious diet; next, allay the thirst—and for this purpose nothing has such a radical effect as 1-drachm doses of iodine, given every night in a ball; while for a tonic, 25 to 30 drops of strong hydrochloric acid should be given every morning, mixed with the drinking-water. When an apprentice, I remember horse-keepers and farmers giving clay-water to their horses to drink when suffering from this complaint, and on inquiring why, I was told that ‘the clay stopped up the little holes in the kidneys, and prevented the urine filtering through!’

**721. Suppression of Urine.**—This takes place when, from some cause or other, the urine is not secreted by the kidneys. It may arise from **fever**, an **inflammatory attack**, or **functional derangement of the kidneys**. *Symptoms.*—The animal is very dull, and makes frequent attempts to stale, but only succeeds in passing very small quantities of urine; on examination (by the rectum), the bladder is found to be empty. Before any treatment is

adopted, it is necessary that the real cause be ascertained. If it arises from the effects of inflammation of the kidneys, strong diuretics are dangerous, whereas, if from the sluggish action of those organs, then diuretics may be given.

**722. Retention of Urine.**—This is very different from *suppression*, as in this case the urine is properly secreted by the kidneys, and passed along the ureters to the bladder in the natural way, but is not ejected. There are many causes for this condition, of which the following are the chief: Extreme muscular contraction, or spasm of the neck of the bladder—**strangury**—due, perhaps, to the application of a fly blister to any part of the body; **paralysis** of the muscles of the bladder; **enlargement of the glands** near the neck of the bladder; the presence of **calculi** in the bladder, or in the urethral passage; or the coagulation of the solid portions of pus discharged from an **abscess** in the kidneys or bladder (*par.* 715). Examples of the three last named have come under my own observation. Again, another great cause of retention is the habit which a horse acquires of refusing to stale except in a box, or stall, with straw under it. On coming in from a long journey, the urine has been retained such a length of time that, even when anxious to urinate, only small jets of the fluid are passed. In these cases the neck of the bladder becomes inverted, and the body of that organ overlaps and presses on the passage or urethra, thus preventing a free flow. *Symptoms.*—The animal is very uneasy, groans, has colicky pains, draws the penis, and makes frequent attempts to stale. The hind-legs are stretched backwards and held wide apart, while the tail is rolled about in various directions, and perspiration bedews the body. *Treatment.*—The hand and arm should be well oiled or soaped, and carefully introduced into the rectum, and the dung removed, after which the bladder will be felt like a distended bag underneath the hand. By the aid of gentle pressure with the hand, and warm-water injections thrown into the rectum, the animal may then urinate; if not, the urine must be removed by the catheter.

**723. Cystitis, or Inflammation of the Bladder,** is seldom seen either in the horse, cow, or sheep, except after cases of difficult

parturition. The most prominent symptoms are that the animal continually passes small quantities of urine, and has colicky pains. *Treatment—Externally.*—Hot applications should be applied to the loins according to the rules laid down for inflammation of the kidneys (*par.* 717). *Internally.* Sedative medicine should be given: for the horse and cow, from 2 to 4 ounces of laudanum, with 15 to 25 ounces of linseed oil; for the sheep, 2 to 4 drachms of laudanum, in from 5 to 10 ounces of linseed oil. Warm water injections should also be given by the rectum.

724. **Abscess in the Bladder** is the formation of pus, or matter, in the bladder, and sometimes occurs in the cow from injury done to that organ in difficult cases of calving, more particularly if there has been a breech presentation. *Symptoms.*—The symptoms are continual paining and straining, with dribbling of urine. On examination (by the rectum), a swelling is felt, and on further examination (by the vagina), it is found to be in the bladder. The neck of the bladder is usually very relaxed, so much so that the fingers can be readily passed through it, and the abscess can be felt with the tips of the fingers of the left hand, aided by the right hand in the rectum. The operation for the liberation of the pus is rather tedious: first, the catheter is passed into the bladder, to act as a director for the insertion of a cannula; the catheter is next withdrawn, and a trocar introduced into the cannula, which is pressed into the abscess; then the trocar is withdrawn, and the matter escapes by the cannula; while pressing the abscess with the right hand in the rectum greatly helps the removal of the matter. The operation being completed, the bladder is washed out with tepid water and a small quantity of tincture of iron. Should any constitutional disturbance arise, it must be combated with fever medicine, and if necessary, hot water blankets or porridge poultices can be applied to the loins (*see Inflammation of the Kidney, par.* 717)

725.—**Calculi, or Stones**, are occasionally found in the bladder, urethra, and kidney; they may form in the kidneys and pass down the ureters into the bladder, or they may accumulate in the bladder itself. One or more stones may be found sticking in the neck of the

bladder, or in the urethra, causing retention of the urine, and, if not removed, may probably cause rupture of the bladder. The horse and dog are most often affected with these troublesome concretions. *Symptoms.*—These are somewhat like those of retention of the urine. In some cases the animal may be urinating fully and freely, when all at once the flow is arrested, the horse making frequent attempts to stale, groaning and straining, but only managing to pass a few drops. On examination by the rectum, calculi are at times found crowding around, especially in the neck of the bladder; these, by manipulation with the fingers in the rectum, may be displaced, and the animal relieved. Sometimes a calculus gets into the urethra, where it sticks a few inches below the anus; it can be seen and felt at the point of stoppage, the parts above bulging out, while the urine trickles down the thighs. With a little labour the stone may be worked back into the bladder, the action being assisted by gently passing up the catheter, or it may get so far down near the end of the penis that it can be cut down upon and removed. When calculi in the bladder of the horse give rise to pain and inconvenience, they have to be extracted by an operation called lithotomy. In this operation the animal is cast and tied much in the same way as for castration; the passage is cut into below the anus, and with suitable instruments the stones are removed, either whole or crushed.

726. **Bulls, Rams, and Wethers**, when too largely fed on mangold-wurzels, or turnips grown with superphosphate alone, suffer from accumulations of white crystals—the *ammonic magnesium phosphates*—in the bladder and urethral passage. When a bull is fed to excess on mangolds, it invariably proves unfruitful. I think this is due to crystals, which have lodged in the barrel of the penis, being transmitted along with the semen at the time of service, interfering with fruitful conception. I have frequently gathered these concretions from the hairs surrounding the sheath of animals which have been feed on the above-named foods. In the ram the passage and *vermiform process*, or worm, on the end of the penis is often entirely blocked with these concretions. When thus affected



the animal suffers great pain; it strains and presses very much, the hind parts swell up, and the urine, if not liberated, gets into the body, producing uræmic poisoning, and causing death. *Treatment*.—Cutting in at the base of the worm, or removing it entirely, sometimes gives relief; the latter I have done on many occasions, both in the ram and wether, and it in no way affected the former as a stock-getter. When wethers folded on turnips suffer from this complaint, the best preventive is to place over the field branches of the common fir-tree—the sheep will eat the bark off them readily, and by its action the formation of the crystals is avoided.

**727. Incontinence of Urine**—an inability to retain the urine, which may arise from a common cold—**catarrh**—attacking and causing irritation of the lining membrane of the urinary organs, or from loss of nervous energy in the bladder alone. Both conditions give rise to a continuous dribble of urine, which must be treated according to the cause.

**728. Paralysis of the Bladder** is a want of nerve power in the organ. It may be the result of local or general paralysis, milk fever, injury, or overdistension with urine. In the last case the muscles of the body of the bladder become so stretched that they lose their tone, and are unable to contract and assist in expelling the fluid in the usual way. Although the urine is constantly dribbling away, on examination (by the rectum) the bladder is found to be full of water, which must be drawn off with the catheter. If the complaint is simply due to loss of nerve power, without other complications, a tonic, such as 1 drachm each of sulphate of iron and nux vomica, should be given daily, along with a liberal and nutritious diet; should it, however, occur as the result of some other disease or injury, special treatment is required.

## DISEASES, ETC., OF THE MALE GENERATIVE ORGANS.

**729. Orchitis, or Inflammation of the Testicle**.—This occurs in the male species of all our domestic animals, but, generally speaking, the ram is the greatest sufferer. It arises from some

injury, such as a kick, and as a result the parts undergo inflammation, which is manifested by heat, pain, and swelling, the pain being very great if the animal is made to move; there is also a great amount of fever and constitutional disturbance present. *Treatment*.—When the animal is in high condition, blood letting has a decided and beneficial effect; an aperient (such as linseed or castor oil) and warm-water enemias are required, followed up by doses of nitrate of potash in the drinking water. The parts should be well fomented for an hour, then smeared over with the extract of belladonna, and covered up with cotton-wool. The testicles ought then to be supported by a broad bandage secured round the loins, behind the legs and over the quarters, and for this purpose a long netted window curtain answers best. These cases, if at all severe, may end in dropsy of the scrotum, termed **hydrocele**, which has to be relieved by tapping.

**730. Injuries to the Penis.**—These are due to many things, the chief of which are the following: A kick, a blow with a whip or stick, and a mishap while jumping a stone wall, stake, or wire fence. At the seat of injury there is much pain and swelling, accompanied by feverish symptoms generally. Sometimes the swelling is so great that the organ hangs loose and pendulous, and cannot be retracted again into the sheath; this is called **paraphymosis**. When this condition is met with, scarification must be resorted to; this is done by a lancet, the point of a clean penknife, or a darning-needle being stabbed into the most prominent parts of the swelling. Follow up with fomentations for forty or sixty minutes, and apply the suspensory bandage as recommended for inflammation of the testicles (*par. 729*). As a laxative give a draught of from 15 to 20 ounces of linseed oil, or from 2 to 3 ounces of Epsom salts, and  $\frac{1}{2}$  ounce of cream of tartar in a mash, night and morning. In recent cases this treatment soon sets matters right, but in chronic cases a tonic treatment has to be adopted. Swelling of the penis may also arise from **protracted strangles**, **influenza**, and other debilitating diseases.

**731. Excoriation of the Penis (Vesicular and Abrasive Sores on the Penis).**—This is mostly seen in stallions as a result of

excessive service in hot weather, particularly when the grooms are not sufficiently careful to wash the parts well with cold water immediately after service. It may also arise both in the stallion and bull from having communication with a female suffering from chronic inflammation and ulceration of the vagina (*par.* 752), or from whites (*leucorrhœa*, *par.* 751). *Treatment*.—Take the animal off service, and wash the parts, and also the sheath, night and morning, with a mixture of 1 part phenyle and 80 parts water. Afterwards dress with the following lotion: Sulphate of zinc, 2 drachms; fluid sanitas, 5 ounces; cold water, 1 pint.

732. **Sebaceous Accumulations in the Urethral Sinus** (*Plate XVIII., R*) are collections of solid, clay-like matter in the cavity round the opening of the urethra, at the point of the penis of the horse, which occasionally cause lameness in one or both hind-legs. In four cases, in my practice, the animals could not pull their hind extremities forward, but stood with them stretched backwards, as if in the act of staling. On washing the penis, and removing the hard matter, they pulled themselves together as if nothing had been amiss. In three other cases the horses had a peculiar lameness in one hind-leg, without any apparent cause; but on examining and removing the collected material from the penis the lameness disappeared. *Prevention*.—Wash the parts with soap and warm water once every five or six months, and remove any accumulation that may be present.

733. **Castration** (the Operation of Removing the Testes).—One of the oldest operations on record. The main object of its performance is to render animals more docile and easy to manage, and although it has a marked quietening effect in the horse, yet the stallion, when trained, worked, and fed in the same way as a gelding, generally does its work with equal ease and docility. Of all the animals subjected to the operation, the best results are seen in the bull—as witness the calm, quiet appearance of the eye and head, and the easy comportment of a big three or four years old bullock compared to the rugged forehead and the fierce eye of a bull of the same age. Although castration can be performed with ease and

success, the operation, at the best, is not one of a pleasant nature; but when the safety of mankind is at stake, the end justifies the means. In the horse the time selected for castration is when the animal is rising one year old—in the spring months, April and May—just before it is turned out to grass, but the operation can be performed at any age and at any time.

734. **The Horse.** At the present day there is a great amount of controversy going on between those who favour operating on the colt in the standing posture, and those who cast and secure the animal. The use of chloroform is also being discussed, but, generally speaking, every operator has his own particular method. An old-fashioned, yet I think the best way, is to cast and secure the colt; then, before operating, wash the penis well with cold water and carbolic soap, dry it with a clean rough towel, and pour into the sheath a little carbolic oil, smearing some of it also over the bag (scrotum); next press the testicle tight into the scrotum, holding it firmly there by the left hand; then by one quick sweep of a sharp knife make a bold opening, and expose the gland, which is seized and pulled gently up; the clam is put on about from  $1\frac{1}{2}$  to 2 inches up the cord, and with the hot iron—dead red-heat is best—the non-vascular, or hinder portion, is quickly cut through, and liberated from the clam; next the spermatic cord (or string) is slowly seared through, and when satisfied that the bleeding has stopped, by gently opening and shutting the clam, let the parts go, and treat the other testicle in the same way. This mode of operating, with an ordinary colt, only takes from eight to twelve minutes to cast, tie, wash, castrate, and liberate, and owing to the success attending it, I am very partial to it. Many operators, however, both qualified and unqualified, open the scrotum with the hot iron, and are very successful. Other forms of operation are to remove the testicles with the *ecraseur*, *demasculator*, or by *torsion instruments*. I have tried these instruments, but do not favour them, as, in many cases, profuse bleeding followed.

735. Some operators, again, lay open the scrotum with a knife, and fix on to the cord a clam made of two pieces of wood, for the purpose

of stopping bleeding; this is one of the methods of operating in the standing position. There is no doubt that this is a most cruel proceeding, whether performed lying down or standing; to leave a pair of wooden clams dangling at the end of the cord for several hours, to be pulled up and down by the action of the muscles into the raw, open wound, must be highly painful and irritating to the unfortunate animal. The clam should only be used in cases of **hernia** (rupture), and should then be put on over the skin. With reference to the standing operation, I think it fool-hardy on the part of the owner as well as the operator. Many things can be urged against it; for instance, when the ecraseur is about half-way through the cord, the animal suddenly drops down, and the operator, not wanting to be beat, sticks to the instrument and so drags the cord too far out: one case like this would satisfy me. As for injuring the animal in casting, the record of such cases is extremely small; I cannot remember a single case of mine where any harm resulted from casting with the side-lines.

**736. Crushing the Testicle** (which, in my opinion, is a cruel operation), **scraping** the cord through, **tying** the cord with silk or antiseptic thread, and **tying** the bloodvessel alone, are all practised, but, as already stated, I prefer casting and using the hot iron.

**737. The Rig** is a horse in which one or both testicles have failed to come down into the scrotum. In ordinary castration, should one testicle only be down at the time of operating, I make it a rule to take it away so that the other may develop, and subsequently descend. With a few exceptions, this has taken place, removal following in the ordinary way. Should this not happen, the best time to operate on a rig is when it is rising three years old. Several members of the veterinary profession have made a speciality of this operation, which they perform very successfully, but the great secret seems to be in the manner in which the animal is tied for the operation. Generally the testicle that is retained in the abdominal cavity is of a morbid character.

**738. The Bull.**—As a rule, the young calf, when five or six

weeks old, is castrated by its owner ; but, when asked to operate, I get an attendant to cast and hold the animal in a sitting position on its hind-quarters, with a strap round both hind shanks, on which the foot is placed. The testicles are next pressed up tight, and with a quick sweep of the knife a good opening is made into the scrotum, first on one side, and then on the other, making both cuts into one at the end ; next get hold of the testicle, cut through the non-vascular portion, and either draw the cord or pull it tight, and cut it quickly through. When operating on the bull from six to twelve months old, it is best to have the animal standing, and held by an attendant by the nose, with the right side against a wall, door, or gate ; the operator stands on the left behind the hind-quarters, and, grasping both testicles at once, makes a clean cut with the knife, first on one side, then on the other, round the end of the scrotum ; the non-vascular portion is next severed, then the clamps are applied to the vascular part of the spermatic cords of both testicles, about 2 or 3 inches above those organs, and both are slowly seared through at once with the hot iron.

739. **The Pig.**—An attendant usually holds it firmly by the hind-legs, with the back towards the operator ; the testicle is pressed up behind close to the tail root, and cut down upon with a sharp knife ; the testicle is then pulled up, and the cord laid over the sharp edge of the knife and cut quickly through.

740. **The Lamb.**—Shepherds are generally the best and most fortunate operators on this animal, cutting through the skin of the scrotum with a knife, and drawing the testicle and cord out with their teeth. The operation on an **aged ram** is most successful when the bag is divided with the hot iron and the testicles are seared off with the same.

741. *After-Treatment for Castration.*—If the colt has been indoors before the operation, keep it in a box till the parts are healed. If out at grass, bring it in, and keep indoors until the day after the operation ; after which, if the weather be fine, let it out daily for a few hours. As a result of castration, swelling to a greater or lesser

extent occurs ; this drops down into the sheath, and, if left alone for five or six days, usually disappears. Should the sheath be very big and pendulous, stabbing with a small lancet, a darning-needle, or the point of a *clean* penknife, allows the escape of the collected serum. *Precautions.*—Before operating it is of the utmost importance to ascertain that there is no cold, influenza, strangles, or the like, amongst the animals on the farm, or even on the neighbouring farms. Furthermore, the operator must see that his hands and person are thoroughly clean and aseptic, as it is highly dangerous to operate after removing cleansings, making post-mortems, and the like. The owner should also take every care that the box is thoroughly cleaned and disinfected, and the bedding should be of clean straw. Often when blood-poisoning follows the operation the operator is blamed, when the real cause is the dirt and filth in the box in which the animal has been placed. *Complications.*—There are many matters of a serious nature that may arise after castration, particularly in the horse, even when the operation has been performed with skill and dexterity, and without any fault on the part of the operator, such as **hæmorrhage** (bleeding), **protrusion** of the **omentum** (net) or **bowels**, **septicæmia**, **peritonitis**, **tetanus**, **abscesses**, **scirrhus cord**, etc.

742. **Bleeding** may take place immediately after the operation, but by walking the animal about and dashing a few pails of cold water under the tail matters will probably be set right. When the hæmorrhage comes on a few hours after, the opening must be plugged with tow well saturated with tincture of iron and water. This plug should be removed in twelve or twenty-four hours, and the opening re-dressed, if necessary. Bleeding more often happens in the young bull than in the horse, and in some cases it is necessary to cast the animal again, get hold of the cord, and tie a ligature round it.

743. **Protrusion of the Omentum, or Net.**—This, like bleeding, may occur at the time, or a few hours after, the operation ; but the protruding part can be cut off with a knife or the scissors close

up to the body, without any bad effects following. This I have done several times.

744. **Escape of the Bowels** through the incision is, however, very dangerous, and generally due to the animal having had **scrotal hernia**, or **rupture**. Should the bowels escape immediately the animal gets on to its feet, they must at once be secured in a large bed-sheet, which is then tied up round the loins, brought under the tail and over the quarter; the horse should then be re-cast, and the protruding bowel returned, and the opening secured by a wooden clamp.

745. **Septicæmia**, or **Blood poisoning**, may result from the animal not being in a fit condition for the operation, also from the use of dirty instruments, or from the operator having unclean hands, or from dirty and filthy surroundings (*par. 741*).

746. **Abscesses**.—These may form in the scrotum after castration, and give rise to a great amount of trouble. Hot fomentations must be used, and the parts opened when ready—that is, when the swelling is soft and doughy to the touch. This complication is more frequently seen in bulls than in horses.

747. **Scirrhus Cord**.—This is a thickening of the end of the cord, which sometimes follows after castration; it is generally of the nature of a hard swelling, in which small abscesses may gather, burst, and become very troublesome. As to its origin, there is no well-defined cause. The best and most radical treatment is to castrate the animal and dissect the diseased portion out, though some cases recover under the administration of 2 drachms of iodide of potassium given daily for two to three weeks.

748. **Peritonitis**, or inflammation of the covering of the bowels (*par. 314*), and **Tetanus** (*par. 614*) may also supervene.

## DISEASES, ETC., OF THE FEMALE GENERATIVE ORGANS.

749. **Ovarian Diseases**.—The ovaries of the mare and cow may become enlarged, diseased, or affected with dropsy; happily, however, such cases are uncommon in these animals. When



present they are extremely difficult to diagnose, as it is only by negative symptoms that their presence can be determined even by an expert.

750. **Ovariectomy**, commonly called **spaying**, is an operation frequently performed on heifers and she-pigs in many districts, particularly in the Midland counties. It is analogous to the castration of the male, and the benefits claimed to be derived from it are the convenient housing together of both sexes, and the tendency of spayed animals to speedily lay on fat, and, if milking, to give a larger and longer supply. The operation is also the best preventive for mares and cows that are continually coming into season.

751. **Leucorrhœa**, or **Whites**, is characterized by the discharge from the vagina of a glairy, milky-looking, often bad-smelling, fluid, which is sometimes so extensive as to run down the thighs and tail. This complaint generally affects old animals, the cow particularly. It may arise from too long retention of the after-birth or cleansing, or from chronic inflammation of the vagina or womb. The parts are in a very relaxed condition, and the hand can be readily passed up the vagina to the neck of the womb, which is generally found to be thickened, and open enough to allow the passage of two or three fingers. After an attack of this kind an animal seldom breeds again. *Treatment*.—Wash the womb out every second or third day with 2 ounces of tincture of iron or tincture of iodine mixed in 1 gallon of cold water, previously boiled; also give iron tonics with nuxvomica, or preparations of arsenic.

752. **Genital Erythema**—a catarrhal irritation of the lining membrane of the vagina. In extreme hot weather both the mare and cow suffer from this affection, but it is more common in the cow, at times running like an enzootic. The *symptoms* are a great itching of the parts, a discharge of glairy fluid, slight swelling of the external parts, and constant whisking of the tail. When a female is affected in this way, the male should have no connection, as it might contract the same complaint, for it is inoculative; and yet in many cases the male can convey the complaint from one female to another without himself showing any signs of derangement. In the cow the

malady is such that it can be conveyed by an affected animal rubbing its hind-quarters or by whisking the tail against the external parts of another animal, so that the tail of an affected animal should also be looked after, washed, and disinfected. The *treatment* is the same as noted in *pars. 800 and 801*.

**753. Coital Exanthema** a vesicular, pustular, and suppurative affection of the generative organs, commonly known as the 'disorder.' It is highly contagious and inoculative, and affects both male and female, and varies very much in degree of severity. Some cases are very slight, and resemble very much at the onset **genital erythema** (*par. 752*), causing little or no constitutional disturbance, while in others it assumes a more aggravated form. When it makes its appearance in the male, numerous vesicles or small blebs are noticed on the penis, which finally burst and form little ulcers. In the female the external parts of the genital organs are swollen and inflamed. The passage internally is studded with small ulcers and spots of matter, causing an irritative discharge from the parts. There is a great deal of itching, the tail is constantly on the move, and also great inclination to urinate. In the mare it at times assumes an epidemic form, showing all the symptoms of a slight attack of pink-eye (*par. 526*). The animal drops off its food, is very feverish, stiff, and dull, with swollen eyelids and limbs. These symptoms are noticed in from seven to ten days after service. Should the mare have a sucking foal following her, it as a rule contracts the complaint shortly after the symptoms appear in the mother. For further particulars and treatment, see *par. 801*.

**754. Obstructions in the Vagina.**—**False Membranes and Cords** are often formed in the vagina by a doubling of the lining membrane. They may run from side to side, or from roof to floor, and before parturition can take place they have to be cut with a knife, or broken down with the fingers. They usually cause some pain, the animal getting up and lying down as if in colic; but, as a rule, no constitutional disturbance results. **Long-necked tumours** are not infrequently found in the passage; these have to be either twisted or cut off. **Abscesses** are also sometimes formed in the

walls of the vagina, generally in the lower part, between the floor of the passage and the roof of the bladder, but they are also found in the sides or in the roof. They may result from bruises caused during parturition, especially in breech presentations, or from injuries done by mischievous boys pushing sticks up the passage. The most prominent symptom is continual straining. An examination must be made and the abscess opened, as described under Abscess in the Bladder (*par. 724*); but this should only be done by the expert practitioner.

755. **Protrusion of the Vagina.**—The vagina is frequently found protruding or everted to the extent of 8 or 10 inches. This is most often seen in cattle that have been on board ship, and it is sometimes very troublesome in summer weather when they are out at grass, for if it happens once, it has a tendency to recur about every three weeks. If the vagina remains out too long it becomes swollen and congested, and before it can be returned it has to be pricked in several places with a lancet, and the congested fluid pressed out; it should then be anointed with carbolic oil, returned, and kept in its place by stitches of **leather** or **tape**, put through the skin close to the rump-bone with a packing-needle, and carried across to the other side; but on no account must the stitches be put through the lips of the vulva. Aged cows that have had a number of calves are very subject to this protrusion, it being usually noticed five or six weeks before calving, but only while the animal is lying down, as it recedes on rising. The best preventive of this is to heighten the floor behind the animals with firm green turf, which, by raising the hind-quarters, mechanically prevents the protrusion. As a rule it is rarely seen after calving.

## GESTATION, ABORTION, ETC.

## 756. Average Periods of Gestation :

MARE—Eleven months, but varies from 11 to 12 months.

COW—Nine months, also varies.

SHEEP }  
GOAT } Five months, or from 20 to 22 weeks.

PIG—Four months, or from 15 to 17 weeks.

BITCH—Nine weeks, or from 58 to 65 days.

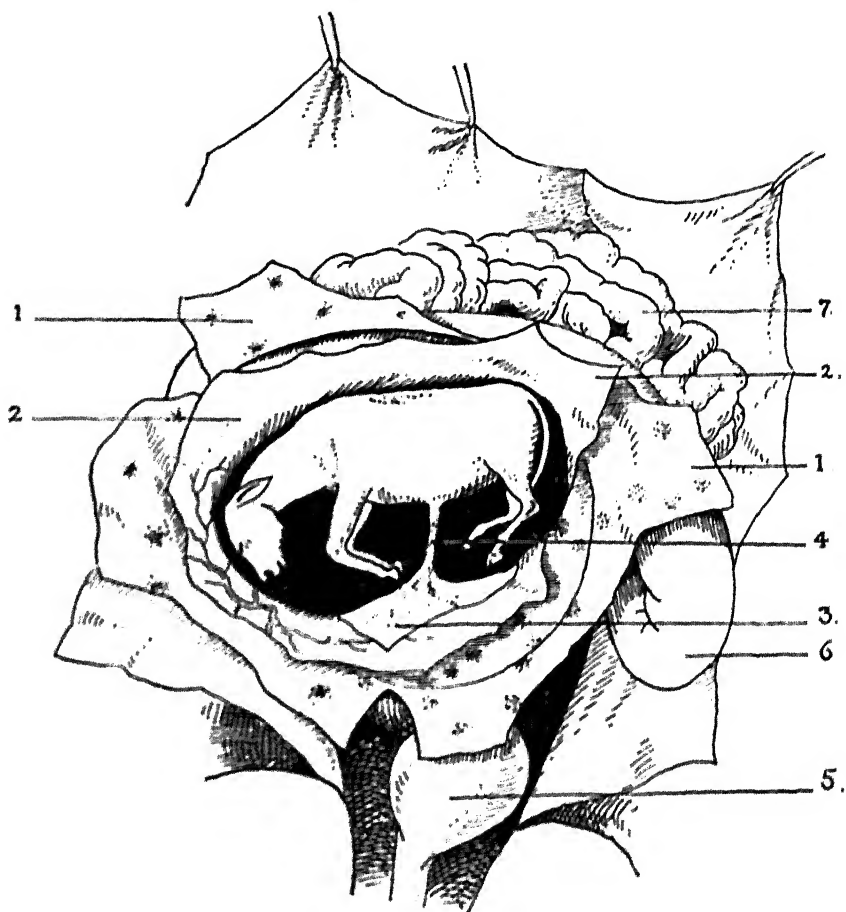
CAT—Eight weeks, or from 50 to 60 days.

757. **Impregnation** of the ovum of the female takes place when it meets the *spermatozoa* contained in the *spermatic fluid* of the male ; to do so it usually travels from the ovary to the womb by the action of the fringes of the Fallopian tubes, which grasp the ovum, and convey it along one of these tubes into the womb. Impregnation may also take place in the Fallopian tube itself. When impregnation occurs, a series of changes begin in the womb. The segmentation of the ovum, and development of the foetus and its membranes, are of too complex a nature to be dealt with in this lecture, but the placenta, or cleansing, is deserving of a short description.

758. **The Foetal Membranes (Placenta, or Cleansing—Plate XLII., Nos. 1 to 3)** are three in number—namely, the **amnion**, **allantois**, and **chorion**.

759.—**The Amnion, or Slime Bag**, is thin and transparent, and in it floats the foetus, surrounded by slime. The **allantois**, or **water-bag**, is situated outside of the amnion, and between it and the chorion. The **chorion** is situated next the womb, and is the vascular coat. A marked difference is seen in the attachment of this coat in the mare as compared to those of the cow and sheep. In the latter there are a large number of **cotyledons**, or **rose-buds**, consisting of ramifications of foetal bloodvessels, which are intimately connected with similar structures on the womb. In the mare, however, the attachment is brought about by villi—small sprout-like projections—which are found all over the outside of the placenta, and are received into corresponding depressions in the mucous membrane of the womb.

# PLATE XLII



## CALF IN UTERO

- 1, 1. Chorion, Outer Covering of Placenta, showing Cotyledons by which it is attached to the Womb.
- 2, 2. Allantois, or Water Bag—the Middle Coat of the Placenta.
3. Amnion or Slime Bag—the Coat next the Fœtus.
4. The Umbilical Cord or Navel String.
5. The Bladder.
6. Large Intestine.
7. Small Intestine.

760.—The *fœtus* is connected with the placenta by means of the umbilical cord, or navel string (*Plate XLII., No. 4*), which is made up of—

1. **The Umbilical Vein**, carrying pure blood from the placenta to the *fœtus*.
2. **Two Umbilical Arteries**, conveying venous blood back to the *fœtal* membranes.
3. **The Urachus**, a tube which connects the allantois with the bladder.

The blood of the mother does not circulate in the body of the *fœtus* directly, the offspring being nourished by the aid of the villi on the outer coat of the placenta, which absorb nutrient material from the blood of the parent supplied to the womb.

761. **Abortion, Slinking, Slipping, or Casting the Calf.**—Of all the diseases that infest the stock of the farm and fold, that of abortion may be looked upon as the most serious. This malady has been known from time immemorial, reference being made to it in Biblical history, for, according to Gen. xxxi. 38, Jacob seems to have known the secret of its prevention; it is, therefore, a great pity he did not leave it behind him for our benefit in these latter days. Abortion, however, is not very common in the *mare*, and when it does occur it is generally the result of an accident. **Sheep** are more susceptible to its baneful influence, but nothing to the same extent as **cows**, among which the causes of abortion are numerous. A solitary case may occur from some injury, such as the animal being caught in a gate or doorway, or by a goad from another beast; from indigestion and distension of the stomach with gas, causing pressure on the gravid uterus, and displacement of some of the placental attachments; from urticaria and specific diseases, such as 'foot and mouth' disease; also from bleeding, the administration of poisonous drugs, etc.

762. When the complaint rages in the epizootic form, and attacks stock on various farms for miles around, it is then that its baneful effect is most bitterly felt. Most of the abortion outbreaks that have occurred in my district have been cases where a farmer changed his holding, sold off his cattle, and then purchased from other farm sales

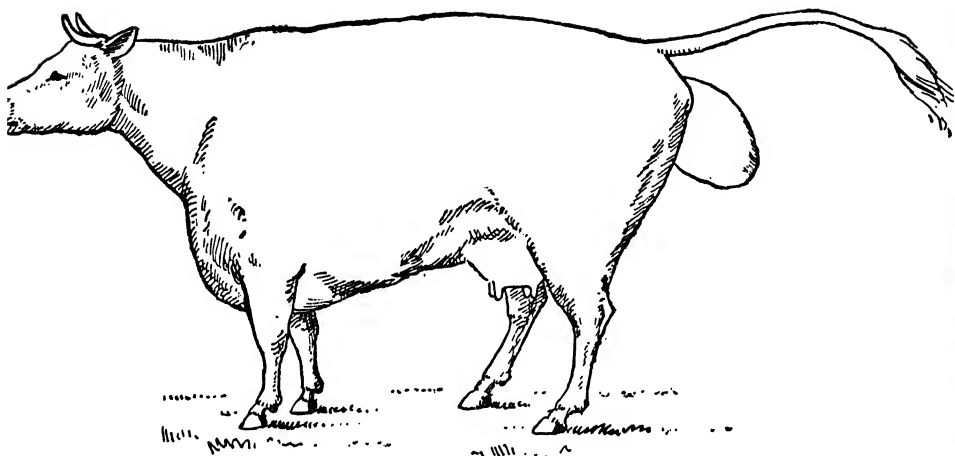
and auction marts a new stock of in-calf cows, most of the parts gone in calf; and then, from injury caused by galloping and mounting on each other's backs, one or more of them has again, from being tied up on the wrong side in a strain amongst strange companions, a cow of a fretful nature becomes unsettled that it casts its calf, with the result that most of them do the same, more especially if the animal commencing it has come from an infected herd. The introduction of a newly aborted cow into a byre or pasture containing in-calf animals is often the cause of spreading the complaint. **Ergot of Rye**, eaten by the cows, has been named as a great producer of the malady, but I have not been able to trace an outbreak to this source. The complaint is as frequent in winter as in summer, and if ergot is a cause it is not difficult to imagine how a cow fed on roots, straw, cake, corn, and so on, might get a sufficient quantity of ergot to produce abortion.

763. Epizootic abortion in cows is now found to be due to the presence of a small oval or rod-shaped bacillus, and is of a contagious character. The disease-producing germs are found in the womb and after-birth, and in the discharges coming from a cow that has aborted, also in the stomach and intestines of an aborted foetus. The infective material retains its virulence for several months, and can be carried from place to place by various means, such as a newly-aborted cow still discharging, also by the food and water-supply which has been contaminated by the morbid discharges, and by the feet and legs of dogs, cats, rats, foxes, etc., and by the hands, clothes, and shoes of the attendants. It is, therefore, highly necessary that every care be used to prevent its spread.

764. The abolition of abortion, in my opinion, is of as much importance as the abolition of tuberculosis, and ought to be legislated for by the Government. An Act of Parliament should be passed making criminal the exposure for sale of an aborted animal, or sending out to grass, amongst other pregnant cows, of an animal that has slipped its calf, until a stated interval has passed. Formerly it was the general custom, when an animal cast its calf, to prepare it for the fat market; this is done by many yet, but on some farms the animals are now kept back for a certain period and again served.

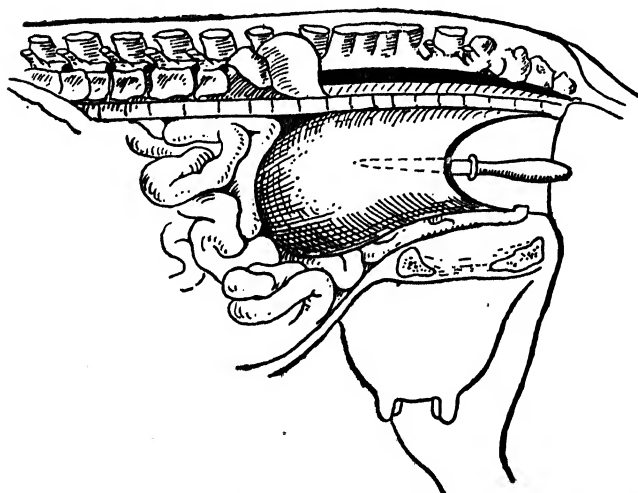
PLATE XLIII

A



A. Cow—Commencement of Parturition, showing Water Bag.

B.



B. Imperforate Hymen, showing Trocar in Position (*pars. 766 and 767*). .



in the course of from two to four years the complaint dies out. The latter is a much better plan than fattening off and replacing with stock from an unknown and perhaps worse affected place.

**765. Prevention.** Various measures for prevention have from time to time been tried, and nearly every district had some peculiar old-fashioned fad of its own, such as burying the aborted calf under the door-step of the byre, or keeping a male goat amongst the stock, etc. Immediately a cow shows signs of parting with its calf it should be put into a box, and left there to calve by itself; *in fact, no cow should be allowed, under any circumstances, to calve amongst other pregnant animals,* and for this reason every stock-breeder should have at his disposal one or more nursery boxes for this purpose. When an animal casts its calf, the utmost care should be taken to keep it from contact with any others that are pregnant, whilst the byres should be cleansed down and washed with lime-wash and carbolic acid once every two months. Little's phenyle or Jeyes' fluid, in the proportion of 1 to 80 of water, should be sprinkled over the tail and hind-quarters of the other animals with a watering-can night and morning; chlorate of potash, or pure carbolic acid, in doses of from 2 to 4 drachms, should be given them every other day every alternate fortnight—from the third month after service to the seventh—in a mash of bran. *Caution.*—Irritating germicidal mixtures should, however, not be injected into the vagina of a pregnant animal—though they are often recommended—as they cause great pain and straining, and are more likely to bring about abortion than to prevent it.

**766. Imperforate Hymen, known as Impervious Os Uteri.**—In the virgin heifer, in perfect health, the vagina is very much corrugated and constricted immediately in front of the neck of the bladder, but beyond its external opening. In this complaint the vaginal passage is entirely obliterated by these corrugations. Strange to say, this lesion is mostly seen in white heifers; I have operated on a large number, but have only met with it in one coloured animal—a light roan heifer. The animal rarely shows any indications of the complaint until it has been served; then the symptoms are developed in a period varying from twelve hours to six weeks, the principal portion of the cases occurring in from twelve to twenty days, when

the patient is noticed to erect its tail, and strain and press as if about to calve. Any faeces which may be in the rectum is forcibly ejected, and in severe cases the rectum is turned out, and bloody mucus is discharged from the vagina.

767. After learning the history of the case, the operator should oil his hand and introduce it gently into the rectum. Immediately the hand is passed through the anus a tense, more or less distended body is felt beneath the floor of the bowel. By passing the hand further forward this bladdery distension is found to extend into the cavity of the belly. Understanding what is amiss, he should withdraw the hand and pass the forefinger of the left hand into the vaginal passage, when, immediately in front and above the neck of the bladder, the obstruction will be found and a roughening felt, a result of the penetration of the male organ in the act of serving. *Treatment*.—For relief, an operation is necessary. A trocar and cannula (the latter being 10 inches long and  $\frac{5}{8}$  inch in diameter—*Plate LII., Fig. II*) is passed up along the vagina and guided by the forefinger of the left hand (the point of the trocar being withdrawn into the tube) until the roughening in question is reached, when both are forced through the obstruction into the bladdery tumour (*Plate XLIII., B*). The trocar is then withdrawn, the fluid passing through the cannula, while its escape is very much assisted by passing the hand into the rectum. The parts are next washed out with a gallon or two of tepid water containing 1 ounce of tincture of iron. I have also operated upon animals that have not been served (one case being that of a white heifer nine months old); the fluid in these cases is like dirty milky whey with a very foetid smell, while in those who have been served the fluid is of a dirty brown colour, with a 'stink' resembling that of a decayed cleansing.

## PARTURITION IN THE MARE, COW, ETC., AND ITS AFTER-EFFECTS.

768. *Plate XLIV., Fig. 1*, shows the natural presentation seen in the domestic animals, the nose being between the knees, and the fore-feet protruding through the vulva. At a cow's first calving all the pelvic ligaments may be well relaxed, yet in some cases there is

PLATE XLIV

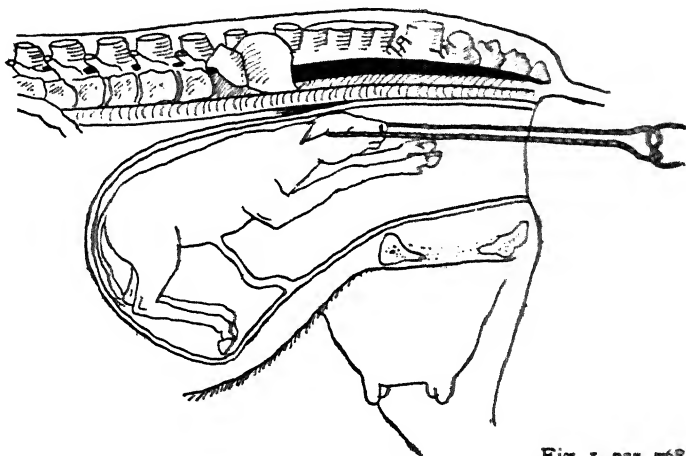


Fig. 1, par. 768.

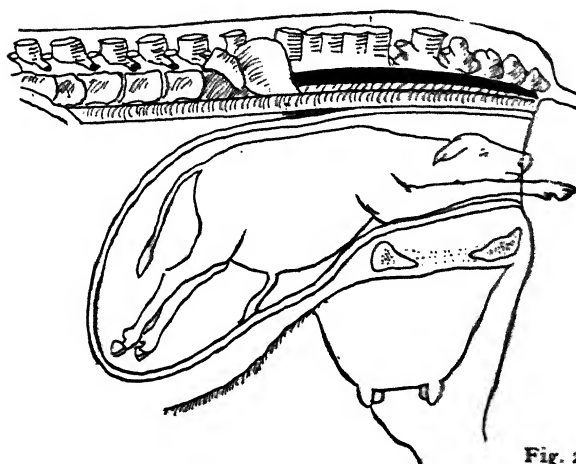


Fig. 2, par. 769.

PLATE XLV

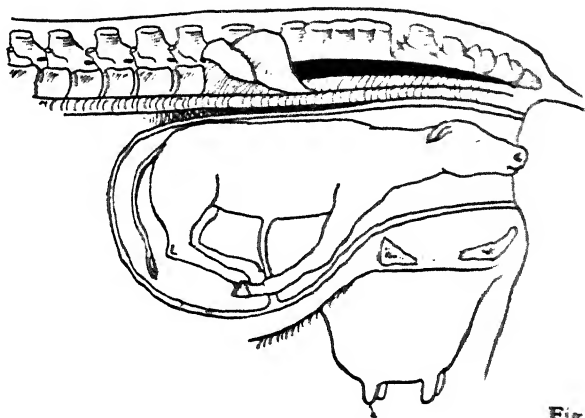


Fig. 3, par. 770.

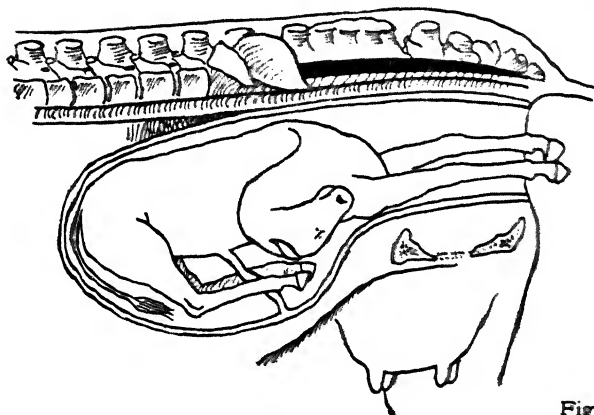


Fig. 4, par. 771.

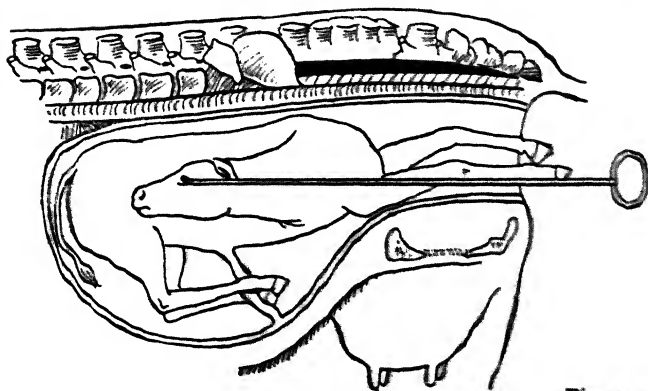


Fig. 5, par. 772

a constricted band round the vulva, or outer opening, for about  $1\frac{1}{2}$  inches, with little or no relaxation of the parts. The owner or attendants usually seize hold of the two fore-feet and pull until the shoulders and the head of the foetus are jammed tightly in the passage, when, owing to the constricted condition of the vulva, the head recedes and is pressed back against the shoulders, rendering delivery more difficult; but at last, by main strength, the foetus is forcibly extracted, causing extensive laceration of the vaginal passage and fatal hæmorrhage. In these cases the hand ought to be introduced into the passage, and the head of the foetus and its surroundings carefully examined; a strong cord should be passed over the head, behind the ears of the calf, and brought along each side of the calf's face, the ends being knotted outside. Thus a loop is formed (*Plate XLIV., Fig. 1*), when, by traction on this cord and manipulation with the other hand, the head is delivered, and by carefully pulling *first one leg and then the other* the foetus is extracted.

769. *Plate XLIV., Fig. 2*, represents a case of dropsy of the belly of the calf. The presentation is natural, and though there seems to be plenty of room, all the force which the owner or attendants can use fails to accomplish delivery. By passing the hand over the head, neck, and shoulders of the foetus, the cause of the obstruction is found in the distended belly of the calf. Some practitioners press a large trocar through the breast or between the ribs of the calf, whichever is the easier of access. For my own part I prefer passing the ordinary parturition hand-knife (*Plate LII., Fig. 2*) between two ribs of the foetus, when it and the water come away readily.

770. *Plate XLV., Fig. 3*, represents the head presented, with the feet back and down. In some cases the head may be pressed back and the feet got up, especially in the mare and ewe, but in the majority of cases it is necessary to dissect the skin back and cut the head off by the first joint of the neck (*atlo-axoid articulation*)—tying the skin firmly round the end of the bone, and leaving the end of the cord outside—then, by pressing the neck back into the womb and getting up the feet, delivery is accomplished.

771. *Plate XLV., Fig. 4*, shows a very common but troublesome presentation. In this we have both fore-legs protruding,

while the head is bent back, with the nose pointing forward behind the elbow.

772. **Plate XLV., Fig. 5,** is a somewhat similar presentation to the last, but the nose is pointed backwards towards the flank.

773. **Plate XLVI., Fig. 6.**—The fore-legs in this case are presented as in Figs. 4 and 5, but the head is turned over on to the back of the foetus. These cases are generally made more difficult by the attendants seizing the fore-legs and pulling them, without examining the position of the head. The feet should be got hold of with cords, and the head secured either by putting a hook (*Plate LII., 6*) into the eye-socket (*Plate XLV., 5*) or the angle of the jaw, or by fastening a strong cord round the under jaw; the foetus must then be pressed back into the womb, and the head manipulated into position. A great deal of trouble is caused by persons tinkering with cases too long before sending for veterinary aid; for, when all the natural waters have been expelled, and the uterine pains exhausted, the uterus will be found to have contracted on the foetus as tight as a glove on a lady's hand. When a case like this is met with, the best mode of procedure is to make 8 to 10 quarts of linseed jelly, strain it through a cloth, and with Read's patent enema syringe pump it into the womb over the body of the foetus. The linseed jelly not only distends the womb and floats the foetus, but acts as a lubricant in place of the natural waters. If the head cannot be got into position after this (which is often the case), the finger-knife or large embryotomy knife (*Plate LII., Figs. 1 and 7*) must be introduced and carried as far on to the shoulder as possible, and then the skin should be cut and divided down the whole length of the limb to the fetlock. Previous to cutting, a cord ought to be fixed round the pastern joint, which an assistant should pull steadily outward. The skin is next detached from the shank-bone and secured by a small cord; then with the fingers the skin is separated from the rest of the limb, up and well over the shoulder, as far as can be reached. The knife is again introduced, and the muscles between the shoulders and the body (pectorals) are divided. Strong traction is then applied to the rope round the fetlock or above the knee, when the limb generally

PLATE XLVI

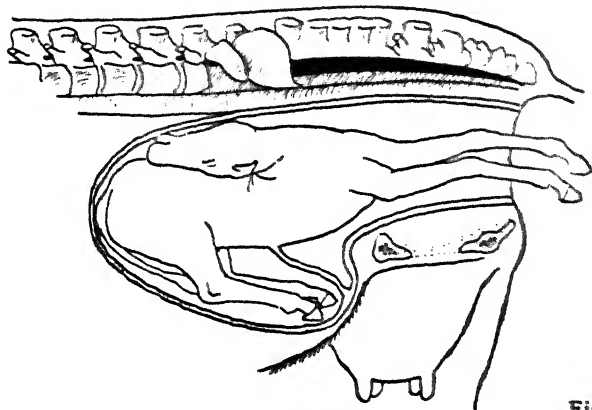


Fig. 6, par. 773

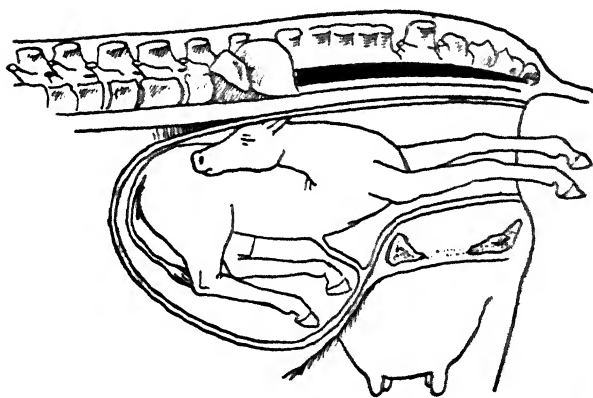


Fig. 7, par. 774

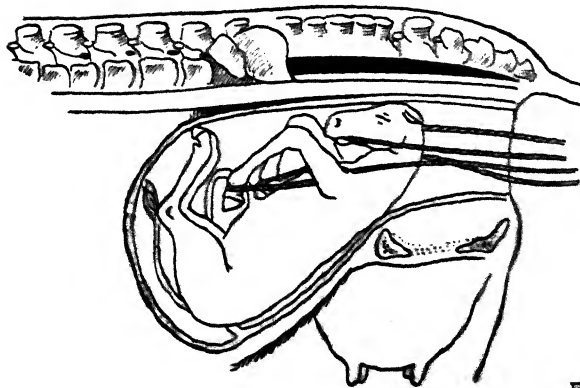


Fig. 8, par. 775

PLATE XLVII

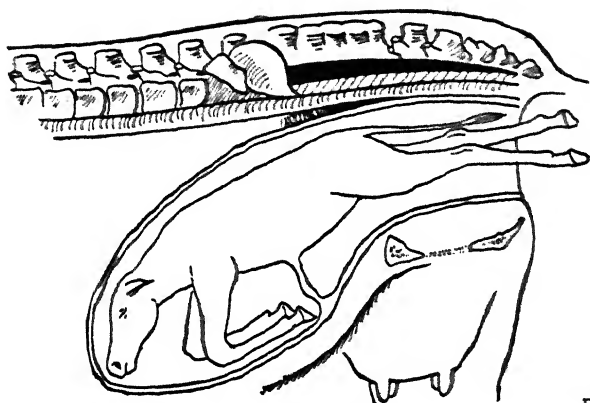


Fig. 9, par. 776

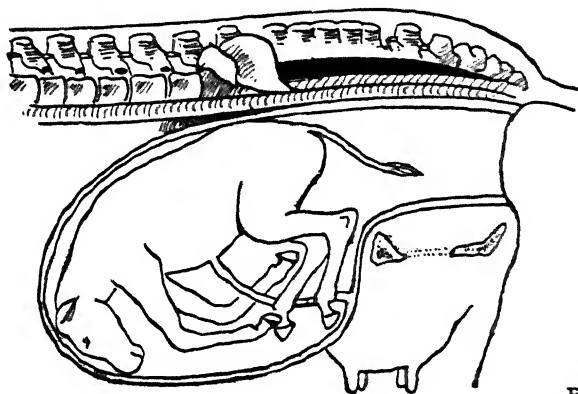


Fig. 10, par. 777.

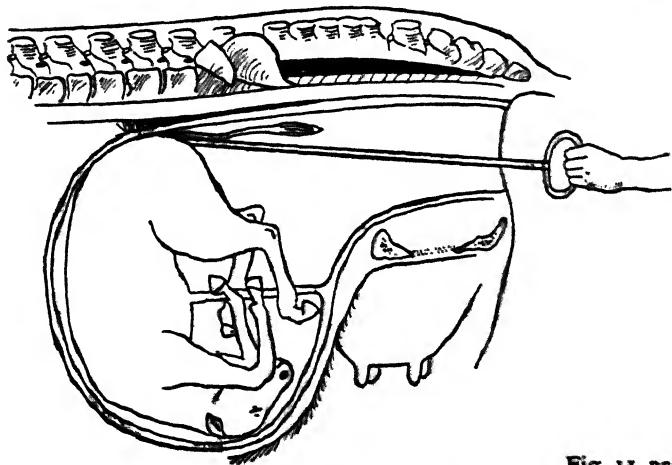


Fig. 11, par. 777.



comes away. The head may then be got into position, but if this is not yet possible the other fore-limb must be removed in like manner, when the foetus loses its support and drops into the bottom of the womb, thus allowing the head to be got round by means of hooks and cords, after which delivery follows.

774. **Plate XLVI., Fig. 7.**—Both fore-legs are presented, and the head is thrown back on to the hind-quarter—a very common occurrence in the mare—the bones of the face of the foetus being developed to correspond with the convexity of the quarter. The feet are usually seen outside the vulva, but only the tips of the ears can be reached. In this case the operator should waste no time in trying to turn the head round, but proceed at once to remove the fore-legs and turn the head as already described in the preceding case. This last presentation in the mare I consider one of the most formidable to be met with.

775. **Plate XLVI., Fig. 8,** represents the foetus on its back, with the ears and back of the head presented, and the feet back. This is most readily put right by casting the patient, rolling it on to its back, elevating the quarters with trusses of straw, and bringing the head of the foetus round by hooks or cords (*Plate LII., Figs. 5 and 6*), when the feet may be placed in position by the hands or secured with ropes.

776. **Plate XLVII., Fig. 9,** is a presentation with the hind-legs coming in proper position for delivery, and this may take place without any inconvenience to mother or offspring, but in many cases where the foetus is large it dies in the birth.

777. **Plate XLVII., Fig. 10,** is a case where the points of the hocks are presented at the brim of the pelvis. Delivery may be accomplished (as is shown in *Plate XLVII., Fig. 11, and Plate XLVIII., Fig. 12*) by repelling the foetus into the womb, and pressing its quarters against the spine of the mother, steadying it there by the repeller or crutch (*Plate LII., Fig. 10*), while the disengaged hand works the foot by pressing the toes into the hollow of the heel, bringing it round over the brim of the pelvis of the mother and into

the passage. Both limbs having been manipulated in this fashion, delivery ensues.

778. **Plate XLVIII., Fig. 13,** shows the tail and breech presented and pressed tight on to the brim of the pelvis. In the cow, delivery may be managed as described in *Plate XLVII., Fig. 10*, but in the mare, if the points of the hocks of the foal cannot be reached—which is generally the case—the only operation, with safety to the mother, is to remove a hind-leg of the foetus by cutting from the stifle, through the hip-joint, to the rump-bone (*ischium*), liberating the head of the femur—not an easy task—and to this attaching a cord, which is pulled outwards by an assistant, while the operator with a knife cuts through the muscles on the inside of the thigh. The leg is thus extracted thigh foremost. After this the abdomen of the foetus must be opened, and the contents of the belly and chest pulled away. Then break through the large openings on the floor of the right and left sides of pelvic bones (*obturator foramina*); through these openings pass a stout rope in the form of a loop, and while the operator presses the remaining hind-limb against the walls of the empty abdominal cavity of the foal, this cord must be steadily and forcibly pulled, and delivery will take place. Sometimes, however, both hind-legs have to be removed.

779. **Plate XLVIII., Fig. 14, and Plate XLIX., Fig. 15,** show all four feet presented in the passage, the latter also showing head turned back on the side or quarter. These cases are of frequent occurrence in the mare, and each can be made either a very easy operation or a most difficult one. It is the latter if some one has pulled the fore-feet outside the passage as far as the knees, while the head is beyond reach and pressed back into the uterus (as in *Plate XLVI., Fig. 7*). This presentation is rendered more difficult through having the hind-feet in the passage. But, if seen early, or before any interference has taken place (as shown in *Plate XLVIII., Fig. 14*), the case may readily be adjusted by attaching strong cords to the *pasterns* of the *hind-limbs*, and while the cords are pulled alternately by assistants, the operator presses the fore-feet back into the womb and delivery is accomplished. The hind-quarters

PLATE XLVIII

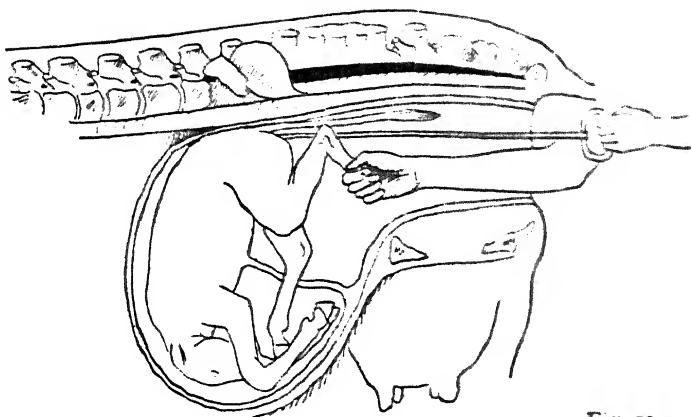


Fig. 12, par. 777

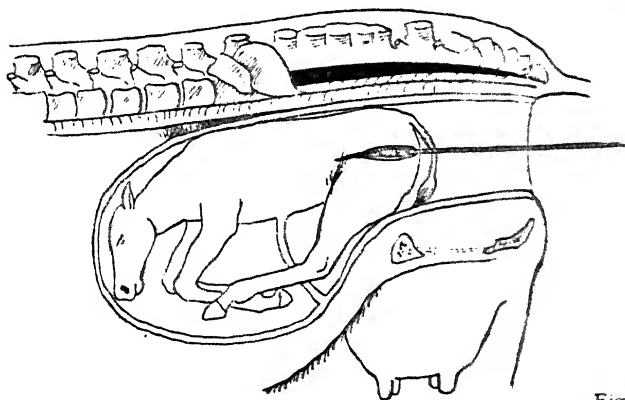


Fig. 13, par. 778.

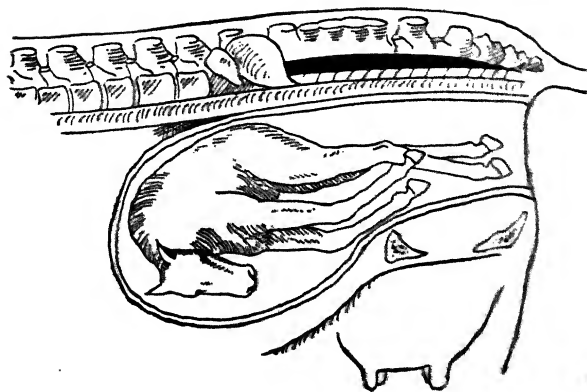


Fig. 14, par. 779.

PLATE XLIX

I.

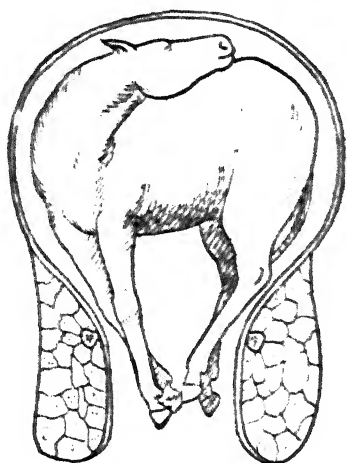


Fig. 15, par. 779.

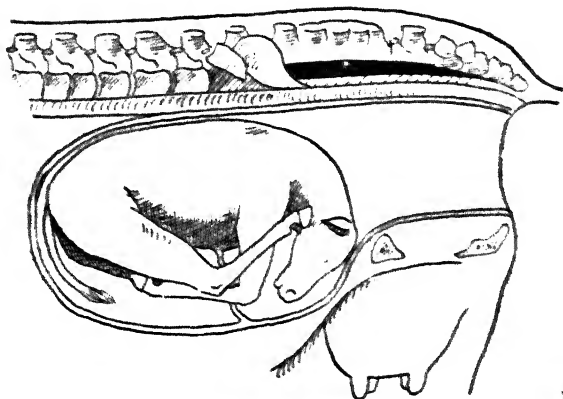


Fig. 16, par. 780.

II.

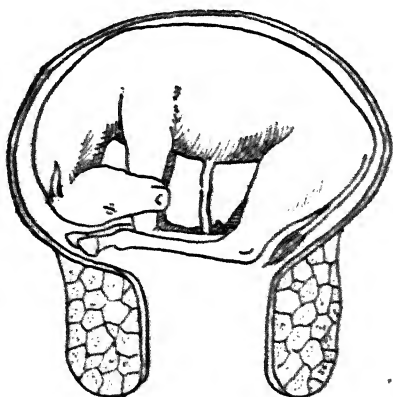


Fig. 17, par. 781.

thus come into the passage, and, by careful and steady traction, delivery is soon over. When the fore-legs are jammed in the passage (*Plate XLIX., Fig. 15*), then, for the safety of the mother, press the hind-feet back over the brim of the pelvis, remove the fore-legs (as described under *Plate XLV., Figs. 4 and 5*, and *Plate XLVI., Fig. 6*), and bring the hind-feet forward (by the cords attached prior to their being repelled); the operator then presses the breast of the foetus back into the uterus, while assistants pull it away, hind-legs first.

780. **Plate XLIX., Fig. 16.** represents a case with the back of the head and neck presented, the fore-legs bent back and the pastern joints doubled round the thighs, while the hind pasterns are pressed against the brim of the pelvis of the mother. The foetus is as rigid as if all the joints were ankylosed. In a case which occurred in the practice of the late Mr. Fisher, M.R.C.V.S., Whitehaven, and after many attempts had been made to straighten the head (resulting in failure), it was at last cut off, and a strong cord was fixed round the neck, close down to the breast, yet the body of the foal could not be stirred; the fore-limb at the shoulder was with great difficulty cut off, and a cord passed round the humerus, and with strong pulling, the leg came away. The sternum (breast-bone) was then detached on each side with the knife and extracted; the first four ribs were removed by passing the knife between the ribs up to the back-bone, and twisting them off; the contents of the chest and belly were torn out, and the remaining fore-leg and the two hind-feet were pressed towards the spine of the eviscerated foetus, while assistants pulled on the neck-cord, and extraction followed. The operation lasted four hours, and the mare afterwards did well.

781. **Plate XLIX., Fig. 17,** is a transverse presentation, where the foetus is lying crosswise in the womb, with the points of the hocks presented towards the *os uteri*, and the quarters pressing to the off-side of the mother, with the hind-feet pressed firmly against the near side; the point of the tail is within reach, but the feet and pastern joints cannot be touched. The best mode of procedure in this case is to cut through the ham-string (*tendo Achillis*) above the point

of each hock, bringing the latter outwards with the hook (*Plate LII., Fig. 6*), put a loop of good strong cord round the joint, press the front of the shank bone against the front of the tibia or leg-bone, and pull the hind legs into the passage, when extraction of the fetus follows.

782. **Plate L., Figs. 18 and 19**, represent twins. It is necessary in all cases of parturition, before any cords are attached or any pulling attempted, that a careful and minute exploration and examination be made, more particularly so in cases of double or triple birth, in order to make perfectly certain that the legs seen or felt belong to the head and neck of the fetus presented.

783. **Plate LIII., Fig. 23**, represents a case of a monstrosity, in which the hind-legs are doubled over the shoulder and the fore-legs under the chin, while the walls of the belly are reflected over the hind-legs, with the bowels floating loose in the womb of the mother. When the bowels are presented first, after careful examination, they must be removed; then with a knife (horse-shoeing knife for preference) cut through the back-bone at the most convenient point and extract the portion readiest to hand by passing in the large hook. When the head and feet are first presented, the case is more serious; sometimes one or both of the fore-legs may be extracted, and by putting a cord round the head, with strong pulling, the back-bone may be broken through. After removing the front portion, the rest is got away with hooks, while the viscera follows. Sometimes these monstrosities are double-headed, and when the heads are presented they are very difficult to manipulate. When the hind-legs are presented first there is a chance of the fetus being got away, providing the mother is well developed, big-boned, and has plenty of room. The double-headed calf (*Plate LIII., Fig. 24*) was removed through a breech presentation, the hind-feet coming first. In the case of the enlarged head—*hydrocephalus*, or *water on the brain* (*Fig. 14, page 350*)—the skull was cut into with the embryotomy knife (*par. 570*) and all the water pressed out, when the bones of the head collapsed and the calf was removed by putting a strong cord round its neck. The

PLATE L

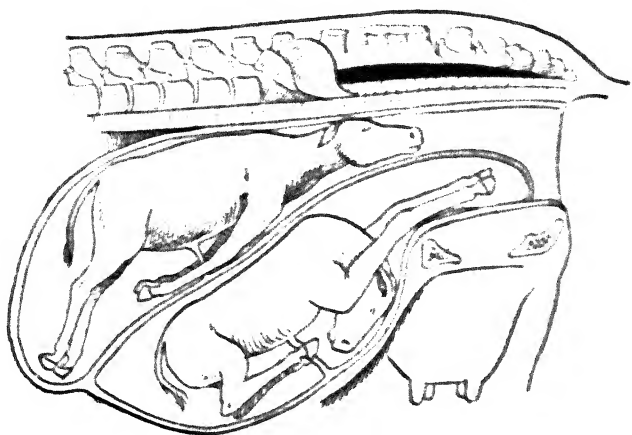


Fig. 18 par. 782.

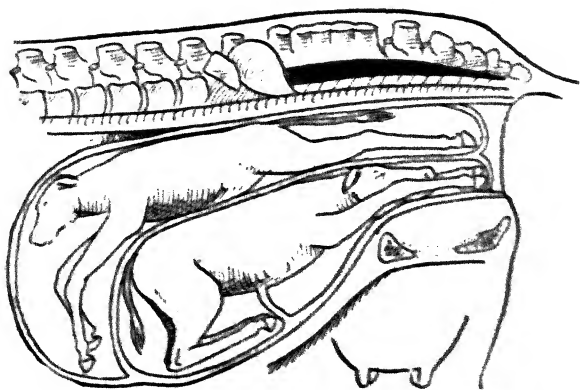


Fig. 19 par. 782.

PLATE LI

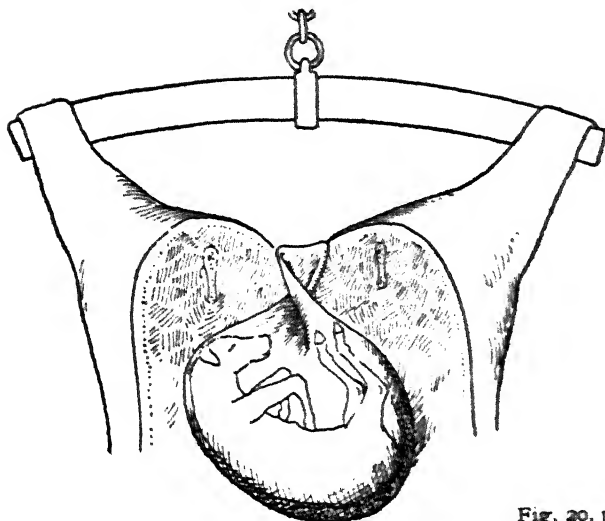


Fig. 20, par. 784

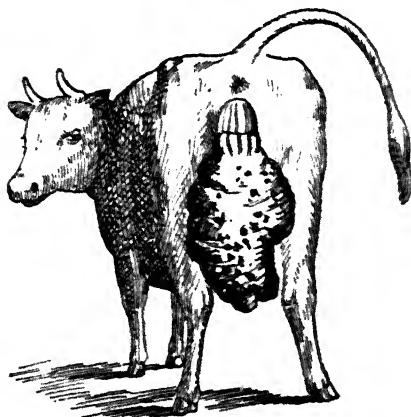


Fig. 21, par. 796.

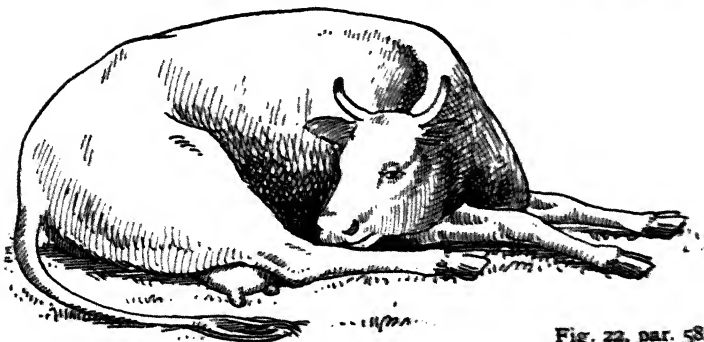


Fig. 22, par. 582.



monstrosity, as illustrated below, is that of a case which occurred in the practice of my friend Mr. H. Barrow, M.R.C.V.S., of Ireby, Cumberland. The skin (Nos. 5, 5) was coming first and hanging outside of the passage. After careful examination all four feet were tied together, with the head in the middle, and the calf pulled away in the form of a cone. The loose skin is the portion that should have covered the belly, ribs, etc. The cow did well after.

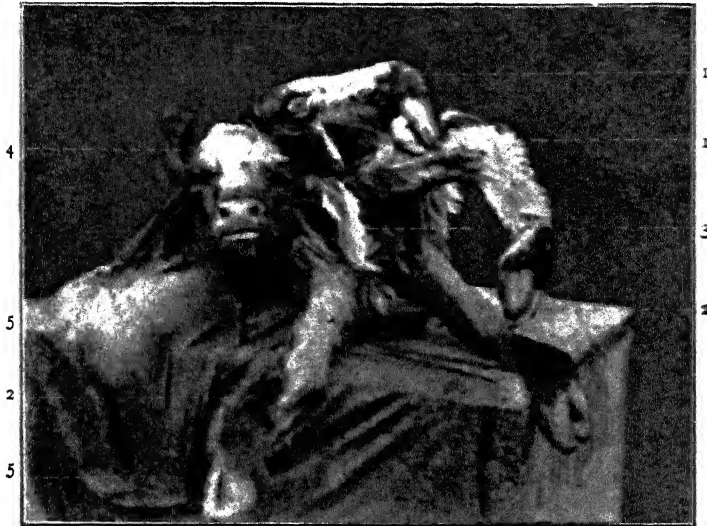


FIG. 17.—MONSTROSITY IN CALF.

1, 1. Hind-legs.

2, 2. Fore-legs.

3. Tail.

4. Head.

5, 5. Fold of skin.

784. Plate LI., Fig. 20, represents torsion of the vagina, or twist in the neck of the womb. I have had several of these (three in the mare); but except in the first case (a cow, which was killed), I have never found a complete twist, but only a partial one. The animal may show signs of parturition, paddling with the feet, screwing the quarters, and whisking the tail; while the pelvic ligaments and vulva are relaxed, but there are no pronounced labour pains. On introducing the hand into the passage, about three-quarters of the

way up, a distinct corded thickening is felt on the lower part of the passage, running from right to left, or *vice versa*, resembling half a screw. After passing the hand over the screw-like parts a pouch is found just in front of the neck of the womb (*os uteri*). On reaching the womb the fetus may be felt. If lying in the position represented in the figure, the head and feet must be secured with ropes and hooks, brought gently forward, and jammed as far into the passage as possible. In some cases, when this is done, the animal drops suddenly on to its side, and thus undoes the partial twist, the result being ready delivery. In other cases the patient has to be cast and rolled: if the twist is to the left, the operator must get a firm hold of the fetus and press it to the right, or *vice versa*, when the animal is directly on its back; then, steady traction being put on the ropes, the uterus may suddenly right itself, and delivery be accomplished.

785. **Constriction of the Os Uteri**, in the cow, is known in Cumberland as 'horny lyer.' On introducing the hand, the neck of the womb is found closed up, is very hard, and will only admit of one finger; when the pains are very strong, a good dose of opium (2 or 3 drachms suspended in hot water), or from 6 to 8 drachms chloral hydrate should be given, while the *os uteri* ought to be smeared with a drachm of extract of belladonna; the patient should be kept perfectly quiet and left alone, when in the course of from twelve to twenty-four hours it may calve all right. Sometimes a cartilaginous ring round the neck of the womb is met with, through which the hand cannot be passed; this ring has a kind of flange, from about  $\frac{1}{2}$  to 1 inch in breadth, and about  $\frac{1}{4}$  to  $\frac{1}{2}$  of an inch in thickness. This must be cut on the upper portion, and also on each side. Smear well with extract of belladonna, give a good sedative (opium or chloral), and wait patiently. But sometimes relaxation does not take place, when delivery has to be attempted by cording the feet and head, and pulling them into the passage, and by taking plenty of time and care extraction may be accomplished.

786. **The Cæsarean Section** is the opening into the side or the belly of the parent, and removing the foetus. This operation may be performed where the offspring is alive and of more value than the

mother. I have been successful on many occasions in saving the lives of foals, calves, lambs, and pigs, but at the sacrifice of the mothers.

787. **Retention of the Fœtus** is sometimes seen in cattle. At the end of the period of gestation the cow shows all the signs of approaching parturition—the udder is distended, the teats pointed, etc.—but there are no direct labour pains, and the animal, though feeding, loses flesh; a few months after it begins to pass various bones by the rectum. In some cases when the cow is a few months gone in calf she will show all the signs of aborting, but no fœtus appears; she will then tighten up, and the bones of the quarters will resume their normal position, and the animal continue to feed and do well until about the full period of gestation, when the after-birth or cleansing will be noticed hanging from the passage, and on examination a mummified calf will invariably be found in the vaginal passage. In other cases the mummified fœtus is only discovered after slaughter.

788. **Eversion of the Vagina** is the turning of the passage or vagina inside out, with the os constricted, and is occasionally met with in ewes in lamb in frosty weather, giving rise to severe straining pains. In such cases apply extract of belladonna, and return the vagina to its position, keeping it there with stitches across the vulva till the os dilates; give also 8 to 10 ounces of linseed oil, with 4 drachms of laudanum. If the weather is mild, these cases may do well; but if the frost continues, they generally terminate in inflammation and gangrene.

789. **Inertia of the Uterus**—the want of power or tone in the womb and vagina, which may be intensely dilated, or in a collapsed condition, with the fœtus lying in a natural position, without any attempt being made by the mother to expel it. I have had most success in such cases by simply introducing the hand into the womb, seizing hold of the fœtus, and drawing it slowly and gently into the passage. Extraction is generally effected without any assistance from the mother.

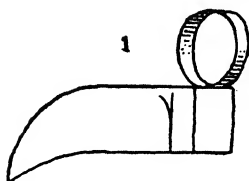
790. **Placenta Prævia** (or the After-birth coming First).—Cases are met with in the cow and ewe where the greater portion of the after-birth comes away prior to the birth of the offspring. This is very troublesome, and has to be cut or torn away before delivery can be accomplished. Great care has then to be used in manipulating the foetus into proper position for delivery. I remember one case where the whole of the cleansing came away from the cow before the calf.

791. **Hydrops Uteri** (or Dropsy of the Womb before Parturition).—This is often seen in the cow and sheep, and occasionally in the mare. As the animal nears the end of its period of gestation, the belly gets to a big size, oppressing the patient, rendering it very weak and languid, and also causing wasting of the flesh. For support, a good broad bandage should be rolled and secured round the body, and good, nutritious food given, waiting patiently until parturition sets in, when, as a rule, an enormous quantity of water comes away, accompanied by a small ill-nourished foetus. In extreme cases, tapping the womb on the right side with a fine trocar and cannula has to be resorted to.

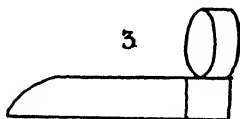
792. **Abnormal Conceptions** are recorded, where the young ones were developed in one of the horns of the womb, or in the belly, outside of the womb altogether (**extra-uterine conception**). In company with Mr. J. Young, M.R.C.V.S., Birmingham, and Mr. Jos. Hewson, M.R.C.V.S., Carlisle, I saw a case of the former in a Clydesdale mare. The vagina and neck of the womb were relaxed and open, the womb dilated to a considerable extent, but nothing in the shape of a foetus could be found inside. On the right side, about 10 or 12 inches from the neck of the womb, was a constricted, rigid ring; on passing the hand through this, the stifle of the foetus could be touched with the ends of the fingers at full stretch; the body of the foal could be distinctly felt through the walls of the vagina and womb; the horn of the uterus being doubled, the head of the foal was in the pelvic cavity, and its nose close to the anus of the mother. After many hours' hard work, we failed to effect delivery, and the mare was destroyed. The

# PLATE LII

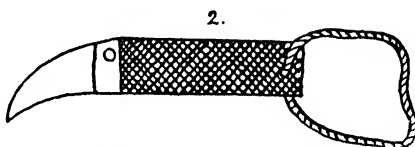
## PARTURITION INSTRUMENTS



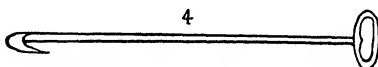
Finger Knife.



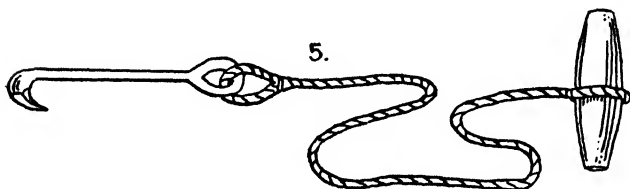
Finger Knife.



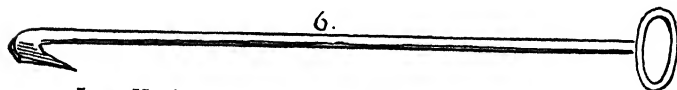
Hand Knife, with Cord for Wrist (Favourite Instrument, also used for Post-Pharyngeal Abscesses).



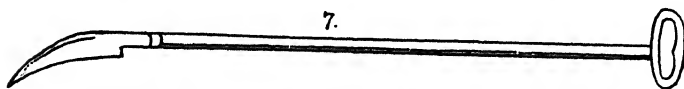
Sharp Hook, for Pigs and Lambs. Length, 15 inches.



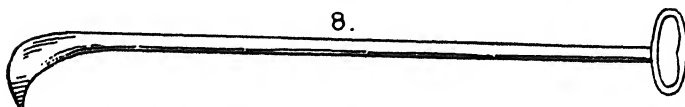
Short Hook, with Cord, for Foal and Calf. Length of Hook,  $3\frac{1}{2}$  inches; Cord, 4 feet 6 inches.



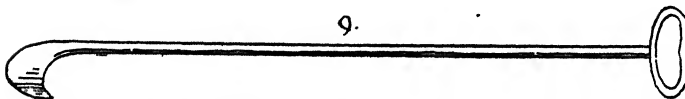
Long Hook. Length, 2 feet 6 inches;  $\frac{1}{2}$  inch diameter.



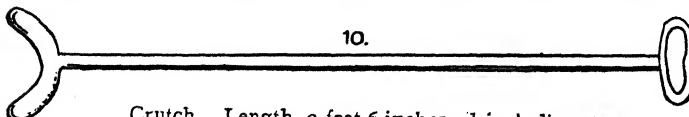
Long Knife. Length, 2 feet 6 inches;  $\frac{1}{2}$  inch diameter.



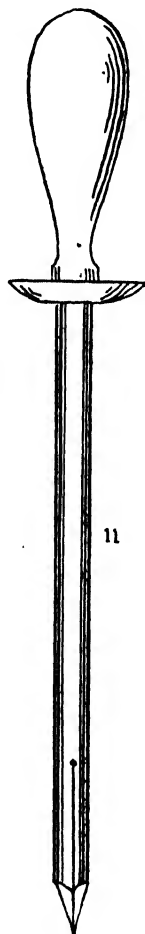
Long Large Hook Knife. Length, 2 feet 6 inches;  $\frac{1}{2}$  inch diameter.



Long Small Hook Knife. Length, 2 feet 6 inches;  $\frac{1}{4}$  inch diameter.



Crutch. Length, 2 feet 6 inches;  $\frac{1}{2}$  inch diameter.



Trocar and Cannula, used in Imperforate Hymen (*pers. 766 and 767*).

position of the foal, and the doubling of the horn of the womb, indicated a breech presentation. Some years prior to the foregoing occurrence I had a similar case in a black-polled cow, but the calf was lying in the opposite direction, with its tail next the anus of the mother, and could be distinctly felt through the walls of the womb. I attended the case for three days, during which time I made numerous attempts at delivery, but failed, and the cow had to be slaughtered. In all cases of difficult labour, although a great amount of patience, perseverance, and manual labour is required, success mainly depends on the judicious use of both hands and instruments (*Plate LII.*), or, as the late Professor Williams tersely used to put it: 'Difficult calving and foaling are accomplished by the exercise of the brain.' Lord Bacon has well summed up the relationship between science and practice in the following sentence:

'Neither the naked hand, nor the understanding, left to itself, can do much; the work is accomplished by instruments and helps, of which the need is not less for the understanding than the hand.'

793. **Post-Partum Hæmorrhage**, or flooding after calving, is mostly seen at the first calving, and is generally due to too hasty and rough usage (*par.* 768). This dangerous and often fatal hæmorrhage requires prompt attention. The animal must be kept perfectly quiet, and cold-water sheets applied to the loins and quarters; if the bleeding is profuse, a cotton bed-sheet must be put into a pail of cold water—to which has been added 1 ounce of tincture of iron—and after being wrung partly out, it should be packed carefully and quietly into the vaginal passage, and left there for three or four days, or until it comes away by itself; at the same time five or six eggs beaten up in  $\frac{1}{2}$  pint of whisky or brandy, in 1 pint cold water, should be given every five or six hours. In many cases, after the bleeding has stopped, the animal will go on doing well, feeding, chewing the cud, milking, etc., for about twelve or fourteen days, when the bleeding may break out again, and before anything can be done the patient bleeds to death. The greatest care and watchfulness is therefore needed from the tenth to the twentieth day. Adrenalin can be given either by the mouth or hypodermically.

794. **Rupture of the Womb** (mostly seen in the mare).—This may occur from the strong labour pains of the mare, forcing the foot of the foetus through the walls; or the womb may be torn and ruptured in manipulating a malpresentation of the foetus, when the bowels of the parent sometimes protrude. These cases are usually fatal. Again, one of the fore-feet of the foetus may be so forced through the roof of the womb and the floor of the rectum as to come out at the anus; or the anus and vulva from the same cause may be made into one common opening. Extensive sloughing usually takes place in these cases (*par.* 32).

795. **Eversion of the Uterus** (Womb Turned Inside Out).—This is not of very frequent occurrence in the mare, but often happens in the cow, ewe, and sow. When it happens in the mare, if the animal is in a standing position, immediately the womb is in sight, every care should be taken to keep her on her feet. The womb must then be supported by a large table-cloth, held by two assistants, one on each side, and the patient led on to a good incline, with its hind-feet on the top, and for this purpose a manure heap answers well. An attendant should stand by with a jug, pouring warm water and milk continuously over the everted organ, and attempts must be made to return it as quickly, yet as carefully as possible. If the patient is lying, it should be kept down and its legs tied, for if it makes an effort to get up, the weight of the everted organ drags the animal back on to its hips, and the womb is in great danger of being burst, or so damaged that the patient rapidly bleeds to death. Before attempting reduction the uterus must be lifted, by means of a large cloth, into a vessel containing warm water and milk; the hind-quarters of the mare should be elevated by means of pulleys, and bags of chaff or bundles of straw packed under the quarter; the neck of the uterus must then be pressed back, and the body carefully kneaded in, particularly at its lower side. As soon as the body of the organ is within the pelvic bones, the hand must be placed on the everted end of the horn of the womb, and pressed gently forward, thus returning the horn to its proper position. If the point of the horn is not properly returned the whole uterus is soon expelled again.

PLATE LIII

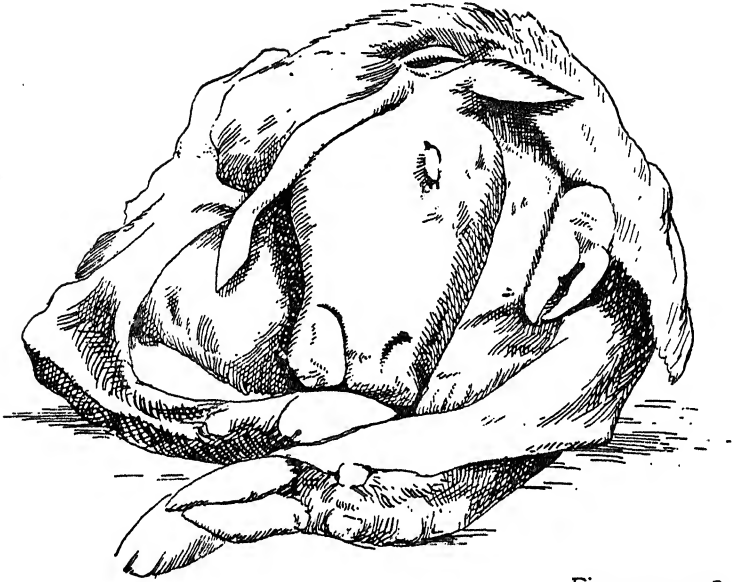


Fig. 23, par. 783.

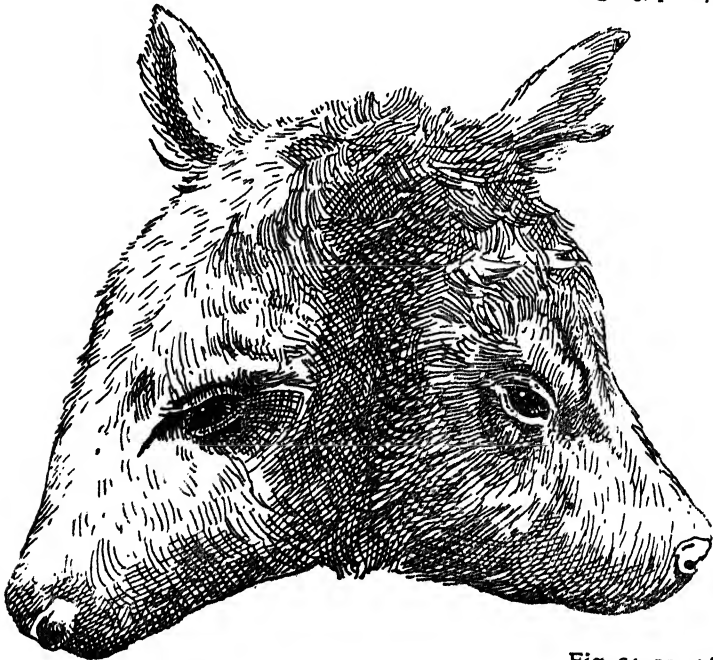


Fig. 24, par. 783.



**796. Eversion of the Uterus in the Cow** (*Plate LI., Fig. 21.*)—

The same course must be adopted as in the mare, except when bleeding, in which case, before attempting to return the organ, the external membranes, if attached, must be removed; the hind-quarters must be elevated by putting a few barrow-loads of farm-yard manure under the hind-feet, or by arranging bundles of straw on each side, in which case the animal lies down. If the animal is lying down, proceed in the same way as for the mare. Cases are frequently met with where the womb has been out for five or six hours, causing the mucous membrane to become much congested, jelly-like, and very stiff, with an infiltration of fluid in the submucous tissue. Before attempting reduction in these cases, the uterus should be scarified (pricked) in several places with the point of a lancet, and kneaded and pressed with the hands to make it pliable. Pressure should never be applied when the animal is straining—always yield to it. After reduction, if 5 or 6 quarts of tepid water, containing 1 ounce of tincture of iron, be injected into the womb, it acts as a good antiseptic, and causes the uterus to contract, closing up any lacerations which may have been caused in reduction. Stitches may or may not be put across the vulva, or a truss may be put on to prevent recurrence. Should the animal strain and press a great deal after operation, the best sedative is to drive it into a pond, letting it stand up to the knees for fifteen or twenty minutes, and allowing it to drink the water if so inclined. A good sedative draught, composed of 1 to 2 wineglassfuls of laudanum and 1 pint of linseed oil, may also be administered. In some cases the womb is torn to such a degree that it has to be cut off—a formidable operation, yet successful cases are recorded.

**797. Eversion of the Bladder** (or bladder turned inside out) occasionally happens. It is easily known by its bluish-green colour and the constant dribbling of water down the thighs, while a portion of the bladder is seen hanging outside. On careful examination of the parts, the *meatus urinarius* (neck of the bladder—*Plate XLI., B 7*) is found. By gentle pressure it can be readily turned; but it is very difficult to keep in its place, though on

driving the animal about, and dashing a few quarts of cold water against the vulva, it will usually retain its position.

798. **Rupture of the Bladder** I have met with, where the mare had begun foaling during the night without assistance, and it always has terminated fatally.

799. **Vaginitis, or Inflammation of the Vagina**, like inflammation of the womb, is mostly due to damage done during difficult parturition. *Treatment*.—Irrigate the passage with Sanitas and water, or phenyle and water, and give fever medicine as recommended for metritis (*par.* 800); but should there be a great amount of swelling externally, and extensive swelling and inflammation internally, the hand must not be introduced, as it does much more harm than good.

800. **Metritis, or Simple Inflammation of the Womb**, in the mare, cow and ewe occasionally follows difficult parturition, when it may result from too long retention of the foetus after the labour pains have set in, or from extreme force having been exercised in extraction of the young one. The inflammation, as a rule, commences in the lining membrane of the womb, but soon extends to the walls of that organ. It generally makes itself manifest within a few hours after parturition, and is usually fatal. In the **mare** the *symptoms* are at first slight colicky pains, the animal walking round the box and sniffing the ground, at intervals standing still, hanging the head, breathing quickly, nostrils dilated, greatly depressed, and the secretion of milk totally suspended, with a foetid, chocolate-coloured discharge from the womb, the pulse small and quick, with a temperature of 106° to 107° F. In some cases the inflammation leaves the womb—**metastasis**—and goes to the feet, producing **laminitis**, or **founder** (*par.* 200). *Treatment*.—Inject into the womb, once a day, 4 to 6 quarts of water that has been boiled and allowed to cool down to 90° F., and to which has been added a teacupful of Condyl's fluid or Sanitas. Give also 1 to 2 ounce doses of hyposulphite of soda every eight hours. For further *treatment*, see *par.* 801.

801. **Septic Metritis in the Mare** occasionally occurs, and may be due to some septic matter having gained admission into the system from impure water or food, but more often by inoculation, arising from some peculiarity of the stallion (**Dourine**), in whose system the septic material seems to hang about for months, or even years, without being perceptible, yet is transmitted at time of service to the mare, in whom it remains latent, only to make itself manifest at the time of parturition. As a rule the mare shows no signs of illness until a few hours after foaling, yet the morbid poison has established its action on the foetus, which may be expelled before its time, or it may go up to or over the full period of gestation. In such cases the foal, although seemingly fully developed, is usually still-born, or it dies within a few seconds after birth. The placenta, or after-birth, is expelled immediately after foaling, and is generally of an unhealthy drab or grey colour. Shortly after parturition the mare commences to be ill, and shows somewhat similar symptoms to simple **metritis** (*par.* 800). Sometimes these cases become complicated, and turn into **pyæmia**, when large abscesses form in various parts of the body. *Treatment*.—First inject the womb as in *par.* 800, and give small doses of aperient and antiseptic medicine, such as hyposulphite of soda, in 2-ounce doses, every eight hours, dissolved in water and given as a drench,—supplemented with 1-drachm doses of sulphate of quinine, dissolved in 10 drops of strong hydrochloric acid, given every eight hours in cold hay tea to drink, or in 1 pint of cold water as a drench. Good nutritive and easily digestible food—green food if it can be procured—must be given. When a case of this kind occurs all in-foal mares on or near the premises should at once be removed to other quarters which are not less than two miles distant, while the buildings and utensils should be thoroughly washed and disinfected. Mares recovering from this malady should not be put to breeding for at least 12 months.

802. **Septic Metritis in the Cow** (infectious inflammation of the womb) shows the following *symptoms*, viz.: Great dullness, prostration, quick breathing, fever, straining, swelling of the external genital organs, and discharge of a dirty brown, blood-coloured fluid

from the passage. *Treatment*.—If, on careful manual examination, no rupture or rent in the womb is discovered, wash it out by means of an enema syringe with warm water and fluid Sanitas or Condy's fluid (*par.* 800), and give as a drench 15 to 20 ounces of raw linseed oil, and if much pain be manifested, add from  $\frac{1}{2}$  to 1 wineglassful of laudanum or 15 drops of Fleming's tincture of aconite. As a fever medicine, 2 to 3 ounces of Epsom salts, and 3 drachms of nitrate of potash in a mash of bran, or in water as a draught, may be given every eight hours. Warm-water enemas thrown into the rectum, and porridge poultices applied to the loins, also have a soothing effect.

803. **Simple and Septic Metritis in Sheep.**—The simple form of metritis is rarely seen in the sheep, but in cold, frosty spring weather lambing ewes often suffer extensively from **septic metritis**, which, by its severity, causes great loss to stock-owners. Sheep show similar symptoms to those described in the cow—great prostration, and a dirty brown, coffee-coloured discharge running from the womb and trickling down the legs being the prominent characteristics. This disease is highly contagious, and immediately it makes its appearance all the pregnant ewes must be at once removed from the place of infection, and be attended to by another shepherd. *Treatment*.—Wash the parts night and morning with a lotion made of one tablespoonful of phenyle and 1 pint of cold water, which, after being mixed, should be made warm by the addition of 1 pint of hot water. Give internally, twice a day, 1-drachm doses of chlorate of potassium and 5 drops of hydrochloric acid in  $\frac{1}{2}$  pint of cold water.

804. **Retention of the Placenta, or After-Birth.**—In the mare the placenta ought never to be allowed to remain more than from six to ten hours after the birth of the foal, more particularly when the mare is on dry food in the stable, as it often brings on **laminitis** (inflammation of the feet—founder) (*pars.* 200 and 800); in some seasons this complaint almost resembles an epidemic. It may be avoided by the timely removal of the membranes, which must be carefully done, as the smallest piece left is quite sufficient to cause a great deal of

constitutional disturbance, and, in some cases, septic poisoning and death.

#### 805. Retention of the Placenta, or Cleansing, in the Cow.—

The attachment of the after-birth to the womb in the cow is quite different to that of the mare (*par.* 759). As a rule the after-birth comes away naturally a few hours after calving, yet the cow can retain the foetal membranes for several days without any constitutional disturbance being set up; and in some instances they may be successfully removed at any period during the first two or three days. But where there is inertia, or the want of tone in walls of the womb to contract and expel the contents, so long as the cow takes its food, chews the cud and milks fairly well, I leave the membranes alone until the fifth or sixth day in summer, and the sixth or seventh day in winter, when they are, as a rule, extracted without interfering with the general health of the animal. I strongly condemn the forcible tearing away of the after-birth from the womb of a newly calved cow, as in the majority of cases it produces great nervous prostration and general debility. I have tried numerous medical agents, including a strong decoction of Mugwort, to assist in the expulsion of the cleansing, but have found nothing to answer as well as 2 to 3 ounces of hyposulphite of soda, 1 ounce of ground ginger, and 2 drachms of powdered *nux vomica*, mixed and given every night for a week as a drench in 1 quart of thin treacle gruel. In removing the retained cleansing I generally inject into the uterus 8 or 10 quarts of tepid water containing a small portion of Condyl's Fluid or Sanitas; then, on introducing the hand, by gentle traction and twisting of the membranes, they are removed. I have a great objection to cutting small pieces off the portion of the membranes that may be hanging outside, and have still more objection to farmers tying a horse-shoe or other weight to them. The membranes which are hanging outside can, however, be rolled up into a knot to be out of the milker's way, and then taken away as described above. After removing the placenta from the mare and cow, I usually inject into the womb 5 or 6 quarts of tepid water containing 1 ounce of tincture of iron, which is a good antiseptic. Notwithstanding the

decayed and foetid condition of the cleansings at times seen hanging from cows, I have never yet seen one struck with fly or maggot.

**806. Dropping from Retention of the Second Cleansing** (Partial Paralysis after Calving).—Cases are met with where the after-birth comes away all right a few hours after calving, but in the course of from two to six days the animal is found lying down and unable to rise, yet it feeds, chews the cud, and milks fairly well; the breathing is quick and heavy, and the temperature is normal, but still the patient cannot get up. The vulva is puckered up and quite dry, and no discharge is seen from the passage. This condition is considered by many to be milk fever. There are, however, no head symptoms or unconsciousness. The loss of power is through reflex nervous action, and due to the too sudden closing of the neck of the womb, behind which the debris or second cleansing collects and is retained. *Treatment.*—Give a good dose of opening medicine, say 1 pound of Epsom salts and 2 ounces of ginger, in a quart of treacle gruel, to which add 1 pint of linseed oil, and further apply a strong mustard poultice over the loins and clothe the body, when, in the course of twenty-four hours, the animal will probably discharge from the womb a quantity of bloody, slimy fluid, after which it becomes all right. At times the retention of the second cleansing sets up septic fever.

**807. Parturient Septic Fever** in the cow is due to retention of morbid matter (second cleansing) in the womb, and attacks animals more particularly in the early spring months, when east winds prevail. About three or four weeks after calving the cow is noticed to be losing flesh and getting into a low and debilitated condition, with tucking up of the belly, falling off in milk, having little or no appetite, and only occasionally chewing the cud, while the bowels are constipated, the dung being hard and dark-coloured; the lips of the vulva are also puckered up, and of a dirty yellow appearance, and the patient has a peculiar fusty smell. In some cases it is associated with parturient bronchitis or pneumonia (*par.* 538). *Treatment.*—Antiseptic tonic medicines are necessary, such as sulphite of soda, iron, quassia, and vegetable cordials (*par.* 1067, No. IV.) given in

gruel, with the addition of a quart of beer or  $\frac{1}{2}$  pint of small doses of linseed oil should also be given every other day, the appetite tempted with different kinds of food, such as sliced old and potato, sprinkled over with a little salt, though grass or green foods answer the best. Frequent washing out of the in these cases is very objectionable, for, in my opinion, it recovery.

. **Pelvic Hæmatomata**, or blood tumours, are found in vic cavity; they are generally caused by injuries to the parts as of difficult parturition. *Symptoms*.—A few weeks after the animal commences to strain as if in labour, and urine s from the vulva. The patient has a very irregular appetite, tucked-up belly. On examination of the parts (made by cing the hand into the rectum), a doughy swelling is felt, either bottom or on the sides of the bowel. *Treatment*.—The clotted must be removed by cutting into the tumour through the side vagina, after which dress the parts with antiseptics and tow.

. **Mammitis, or Inflammation of the Mammary Glands** der (sometimes called Garget).—All animals of the female sex ject to this complaint. It is occasionally seen in the mare, ng one or both sides of the udder, and may appear a week or fore foaling, but more often happens afterwards, especially if re is in good condition and has lost its foal. Sometimes it when the animal is not pregnant, usually in animals with legs that are predisposed to weed or grease. It may also om a bad wound in the leg or foot, the irritation from which s up the inside of the hind-leg, thus implicating the udder. It a great amount of constitutional fever, the udder being hard nful, while the patient walks with a stiff, straddling gait. *mt*.—If the fever be very high, the head hanging, with quick ng and dilated nostrils, great relief results from bleeding to ent of from 4 to 6 quarts, and after this by giving 15 to ces of linseed oil, and from 1 to 2 ounces of spirits of nitre, tablespoonful of saltpetre in the drinking-water; the udder also be fomented with hot water three or four times every

twenty-four hours, and the teats drawn at the same time, after which they should be well dried with a soft cloth, and a little carbolic oil applied. Sometimes the udder gathers and bursts in several places; the case then becomes troublesome. When this happens the foal (if there is one) should be taken from the mother and brought up by hand.

810. **Inflammation of the Udder** in the cow is very common, when one or more of the quarters may be involved. It is said by many writers to be mostly seen after calving, and to be due to overstocking. This, however, has not been my experience, cases arising from these causes being rare in my practice. There are many causes of mammitis, such as derangement of the digestive system, sore warty teats, vesicular eruptions—as from foot and mouth disease, etc.—kicks and injuries to the udder, irregular milking, stricture and obstruction of the teats, and the too frequent and injudicious introduction of the teat syphon. The greatest number of cases are, however, seen amongst grazing cattle in extremely hot, dry weather, when the animals, irritated by the warble-fly depositing its eggs on their backs, gallop about the fields and then plunge into a pond or river, standing there for hours up to the belly in cold water; or when a few intensely hot days are followed by a heavy splash of rain. The two last-named conditions seem to make the malady spread like an epidemic, and I have seen them give rise to as many as twelve to fifteen cases in one day. *Cows* that are supposed to be stripped dry of milk, and *put out to graze and fatten*, suffer most from this form of the malady. The affection is usually fully established before being noticed, then, on examination and drawing of the teats, the gland is found full of curdled matter. *Treatment.*—For this class of cases splitting the teat with a bistoury, or cutting it off, half-way up, gives the quickest relief, and forms the best exit for the pus. The latter operation may seem cruel, but really it is more cruel to leave the matter pent up in the gland, and to irritate the parts by squeezing it out of the teat four or five times a day; besides, the teat is of little consequence when the animal is being prepared for the fat market. The udder should be rubbed night and morning with carbolic oil, and if there is a great deal of fever and general disturbance the



animal must be treated with cooling medicines, such as 2-ounce doses of hyposulphite of soda, or 4 ounces of Epsom salts and  $\frac{1}{2}$  ounce of saltpetre, along with 3 ounces of aromatic cordials (*par.* 1019), which may be given night and morning in treacle gruel until the bowels respond.

811. When the *dairy cow* is affected, one or more of the quarters may be attacked, either before or after calving; the udder becomes hard and painful, with the teats pointed, and these, on being pressed, yield a quantity of curdled milk and watery fluid. If the inflammation is not arrested at this stage, the complaint may go on until matter is formed, or abscesses form and burst in various parts of the udder, giving rise to great trouble. Again, the gland may become hard and indurated, or even gangrenous. There is no complaint that will, in such a short time, produce so much constitutional disturbance and high fever, and cause the animal to lose flesh so fast, as an acute attack of inflammation of the udder. The disease is occasionally also accompanied with stiffness or lameness of the hind-legs. *Treatment.*—When first observed, and before matter is formed, the affected quarters must be fomented with hot water for from forty or sixty minutes four times in the twenty-four hours. Immediately after the hot fomentations the parts must be washed well with cold water for five minutes, and then rubbed perfectly dry with a soft cloth, after which apply equal parts of carbolic oil and liquid extract of belladonna; cover up with cotton-wool and support with a bandage round the loins and over the quarters. Or, immediately the quarter is found to be hard and inflamed, all the watery fluid must be drawn off through the teat, and the quarter should be treated with an injection of 15 grains of chinisol dissolved in 1 quart of warm water, and repeated if necessary. To be successful in preventing the formation of pus, energy, perseverance, and patience are required; if, however, matter should form, it must be liberated, as already shown. Constitutional disturbances are to be treated with the fever medicines, as recommended for the grazing cow (*par.* 810).

812. *Induration.*—When the udder becomes hard, applications of 20 per cent. oleate of mercury, or iodine mercurial ointment must

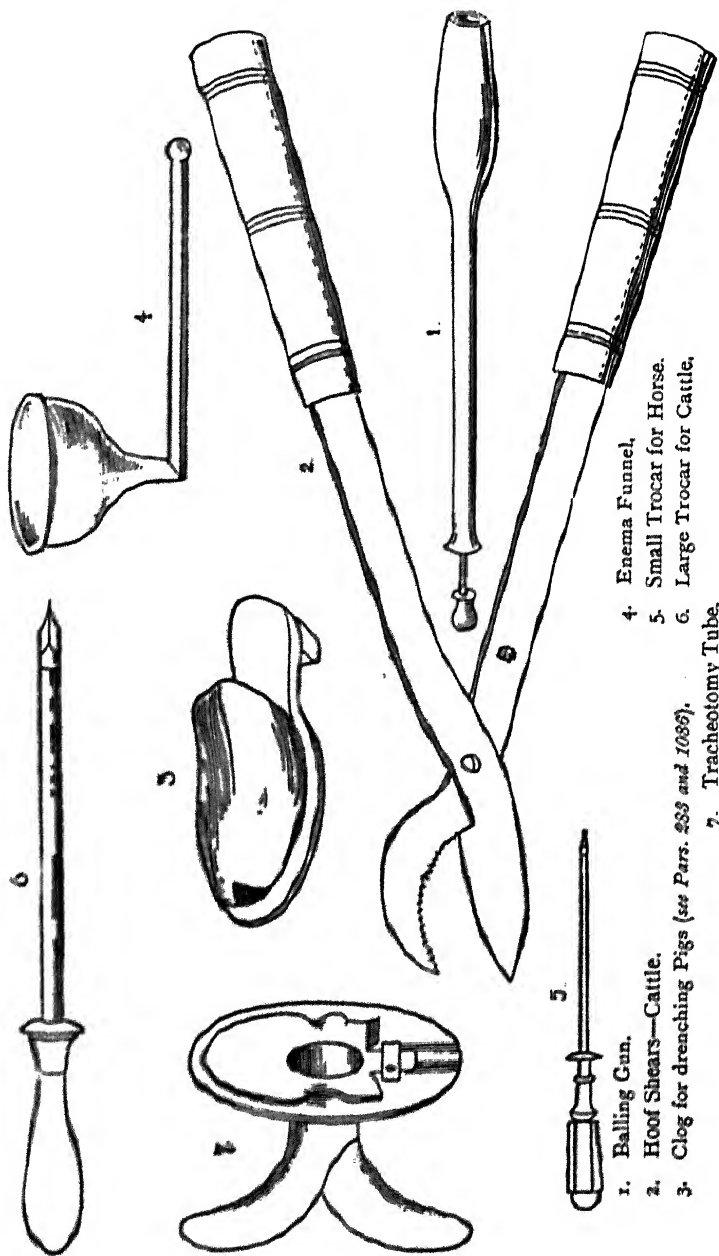
be rubbed well into the parts every third day, and 2 drachms of iodide of potassium, dissolved in a pint of cold water, administered internally daily for six or eight days. If **gangrene**, or **mortification**, sets in, the case usually runs its course in a few days, the udder becomes a dark purple colour, and the animal dies of blood-poisoning, or the glands may slough and drop off (*par.* 816).

**813. Blind Teats.**—Numerous cases are met with where the animal has milked all right, and been perfectly correct up to the time of drying, prior to having its next calf; but after calving one or more of the teats are found “blind,” and on examination, a small hard knot is felt at the end, or in the middle of the passage of the teat. The milk may be liberated with a syphon, but owing to the instrument having to be introduced night and morning, local inflammation is generally set up and the quarter lost. Such cases cause a great deal of unpleasantness and litigation when the animals have changed owners between the time of drying and calving. The cause seems to be that a portion of milk has been secreted after the last milking, the watery portions of which have become absorbed, leaving a small piece of curded milk in the teat, which becomes organized into a small knot, thus blocking up the passage. In these cases, when the teat syphon is used, the instrument should be boiled for five or ten minutes, thoroughly disinfected before introduction into the teat, and well cleaned after use, or inflammation will be set up in the gland and the quarter be lost.

**814. Paralysis of the Milk-Secreting Cells.**—I have known cases where a heavy milker, that has been noted for its large milk and butter giving qualities, previous to calving having an udder which was congested and much enlarged, yet after calving there was an entire absence of milk in the gland. Sales of animals so affected often cause unpleasantness between buyer and seller.

**815. Relaxed Teats.**—Occasionally the teats lose tone, and become unable to retain the milk, which runs off immediately it is secreted. The best treatment for this is to paint the ends of the

# PLATE LIV



1. Balling Gun.
2. Hoof Shears—Cattle.
3. Clog for drenching Pigs (*see* Pars. 233 and 1036).
4. Enema Funnel.
5. Small Trocar for Horse.
6. Large Trocar for Cattle.
7. Tracheotomy Tube.

teats after each milking with *flexible collodion*, or to apply a suitable indiarubber ring round the teat.

**816. Inflammation of the Udder in Sheep.**—The ewe, particularly in frosty weather, suffers very much from inflammation of the udder, especially when the teats are chapped and sore. The derangement can also be produced when the young lambs are affected with *stomatitis pustulosa* (*par.* 237), and **aphtha**, or **thrush** (*par.* 236), and the inside of their mouths are ulcerated, and therefrom irritation and inflammation is set up in the teats and udders of the mothers. The udder is much swollen and painful to the touch, and on pressing the teat a quantity of straw-coloured watery fluid escapes. *Treatment.*—Good nursing, drawing the teats, and rubbing the affected parts with the carbolic oil, are recommended. Hot fomentations, if the parts are not thoroughly dried with a soft cloth when finished, only aggravate the complaint. If the case runs on to gangrene, the udder becomes, first red in colour, next purple, and finally black; and to guard against this, a careful examination should be made twice daily. The lambs must be taken off, the ewe isolated, and carbolic oil or Stockholm tar smeared over the gland, the latter being preferable. If the animal be left alone, it is astonishing to see how soon Nature can assert her influence, the physiological action of the healthy parts throwing off the diseased portions; and in the space of a few weeks the remains of the gland hang from the belly in the form of long fingers of flesh, which can be removed by the clam and hot-iron, the ecraseur, or ligature.

## APPENDIX A

### SYNOPSIS OF DISEASES, THEIR RECOGNITION AND 'FIRST AID' TREATMENT

817. ABORTION.

Casting the fœtus ; premature birth.  
Accidental, from injury ; also infectious.  
Isolate aborting animal, disinfect both animals and premises.  
Give animals carbolic acid and chlorate of potash as preventives.

818. ABSCESS.

Circumscribed swelling containing matter or pus.  
Hot and cold water dressings ; poultices, and blisters.  
Open with knife when ready.

819. ACARI—MITES.

Parasites causing skin irritation and itching, like mange and scab.  
Wash with solution of phenyle or carbolic preparations.

820. ACTINOMYCOSIS.

Wooden tongue, caused by the ray fungus ; affects tongue and jaw.  
To be scarified and dressed with iodide preparations.

821. ACIDITY OF THE STOMACH.

Sour stomach.  
Give alkalis.  
Bicarbonate of soda, potash, lime or chalk.

822. AFTER PAINS.

Heaving or straining after parturition.  
Give dose of laudanum, chloral hydrate, and mild laxatives.

823. AMAUROSIS.

Blindness ; paralysis of optic nerve, with dilated pupil.  
Incurable.

824. ANGLE BERRIES.

Warts.  
Remove with knife, hot iron, or ligature ; dress antiseptically.

## 825. ANTHRAX—CHARBON.

Splenic apoplexy ; blood disease due to anthrax bacillus.  
Attack and death sudden.  
Plug all external openings, as nostrils, etc. Report to police.  
Bury deep or burn without opening carcass.  
Isolate and disinfect premises.

## 826. APHTHA.

Thrush ; vesicles or blebs in the mouths of calves and lambs.  
Dress with boracic acid lotion, or chlorate of potash solution.

## 827. APOPLEXY.

Brain derangement.  
Cerebral, associated with stomach staggers.  
Parturient apoplexy.  
Give chloral hydrate and bromide of potassium.

## 828. ARTHRITIS.

Inflammation of the joints.  
Rest ; hot and cold applications ; blisters.

## 829. ASCITES.

Dropsy of the abdomen.  
Broad bandage round the body.  
Give saline purgatives (salts), iron tonics and diuretics.

## 830. ASTHMA.

Broken wind ; spasm and rupture of bronchial tubes.  
Steam nostrils with medicated watery vapour.

## 831. ATROPHY.

Wasting.  
Attention to diet, with iron tonic preparations.

## 832. AZOTURIA.

Blood derangement.  
Attack sudden ; profuse sweating.  
Discharge of bloody-coloured urine ; great pain.  
Bleeding and dose of physic.

## 833. BLACKLEG, OR BLACK-QUARTER.

Lameness ; crackling swellings on parts affected.  
Affects young stock, mostly under two years old.  
Change of diet ; use salt and seton as preventives.

## 834. BLEEDING FROM WOUNDS.

Ligatures, pressure, styptics, or application of hot iron.

## 835. BOG-SPAVIN.

Distension of the synovial sac in front of hock joint.  
Pressure, blistering, and firing.

## 836. BONE-SPAVIN.

Bony enlargement on the front and inner section of the lower part of hock joint.

Rest ; cold applications ; blisters, and firing.

## 837. BOTS IN HORSES.

Larva of bot-fly in stomach.

Turpentine and linseed oil.

Salt and iron ; green food.

## 838. BRAXY IN SHEEP.

Derangement due to a micro-organism.

Change diet ; give salt.

## 839. BROKEN KNEES IN HORSES.

Wash and dress with antiseptics.

Apply cold-water bandages.

Caustic lotions ; dry dressings.

## 840. BRONCHITIS.

Acute and chronic inflammation of bronchial tubes.

Place in well-ventilated box ; give nitrate water to drink.

Steam nostrils with medicated watery vapour.

## 841. BRUISES.

Cold and hot water applications ; embrocations.

## 842. BRUSHING.

Striking one leg with the other ; faulty action and bad shoeing.

Cold-water bandage to injured part ; attention to shoeing.

## 843. BURNS AND SCALDS.

Protect part from the air.

Apply treacle, or equal parts lime-water and oil.

Cover with cotton-wool.

## 844. CALCULI, INTESTINAL.

Dust-balls in large intestines.

Laudanum and chloral hydrate to relieve pain.

Strong purgatives to be avoided.

## 845. CALCULI, URINARY.

Gravel—dogs, sheep.

Operation necessary.

## 846. CANKER IN HORSE'S FOOT.

Degenerate horn on sole of horse's foot.

Dress with powdered alum or sulphate of copper, carbolic acid, formalin, etc.

Keep thoroughly dry.

## 847. CANKER OF EAR.

Fœtid discharge from lining of dog's ear.

Wipe clean with cotton-wool.

Do not wash ; dress with iodoform.

## 848. CAPPED HOCK, KNEE, AND ELBOW IN HORSE.

Collection of fluid underneath the skin.

Hot and cold applications ; stimulating lotions and pressure.

## 849. CATARACT.

Opacity of the crystalline lens, in horses and old dogs.

Treatment of little avail.

## 850. CATARRH.

Cold in the head, bowels, or bladder.

Irritation of mucous membranes, with watery discharge.

Steam head with medicated watery vapour.

Give chlorodyne and small doses of linseed oil.

## 851. CHOKING.

Obstruction in the gullet.

Try to remove with hand, or pass the probang.

When left side (cow) much distended, puncture with trocar or knife.

## 852. COLIC.

Gripes, spasm of intestine, two kinds, flatulent and spasmodic.

Give linseed oil and laudanum, with either spirits of nitre or turpentine.

## 853. CHOREA.

Involuntary spasmodic movement of the muscles.

Give nerve sedatives—chloral and bromides.

If in dogs from distemper, give Fowler's solution.

## 854. CONJUNCTIVITIS.

Inflammation of the outer covering of the eyeball.

Remove irritant ; bathe with tepid water ; apply boracic acid lotion.

## 855. CONSTIPATION.

Torpidity of bowels.

Mild laxatives ; warm water and glycerine injections.

## 856. CORNS IN HORSES' FEET.

Bruise of sensitive sole, inner heel.

Rest ; remove shoe, and put on poultice made of cold water and bran.

Bar shoe, or indiarubber bar pad.

## 857. COUGH.

A forcible expulsion from the respiratory organs due to many causes.

Give equal parts of chlorodyne and glycerine.

## 858. CRIB-BITING AND WIND-SUCKING.

Feed on the ground ; iron stable fittings ; put on muzzle.

## 859. CURB.

Sprain of ligament or tendon back of hock joint.

Rest ; hot or cold applications ; blistering and firing.



860. DEBILITY.  
Weakness.  
Stimulating tonics, with easily digested food.
861. DIABETES INSIPIDUS.  
Great thirst ; passing large quantities of urine.  
Peculiar to the horse.  
Iodine preparations.  
Good, nutritious diet.
862. DIARRHŒA.  
Scouring ; profuse discharge of fluid fæces.  
Small doses of linseed oil and laudanum, and tincture of ginger or spirits.  
Well-boiled gruel and milk, or linseed jelly, to drink.
863. DISLOCATIONS.  
Bring bones into natural position ; splints and bandages.
864. DISTEMPER IN DOGS.  
Febrile disease common to young dogs.  
Keep warm ; give mild dose of castor oil and buckthorn.  
Hyposulphite of soda and quinine.
865. DROPSY (*see* Ascites).
866. DYSENTERY.  
Fluid discharge of fæces mixed with blood.  
Give carbolic acid or creosote, or oil of cloves in glycerine or linseed oil.  
Well-boiled gruel and milk or linseed jelly to drink.
867. ECLAMPSIA.  
Reflex nervous affection about period of parturition.  
Give chloral hydrate and bromide of potassium.
868. ECZEMA.  
Skin affection.  
Wash with izal, phenyle, Sanitas, or chinosol solutions.
869. ELEPHANTIASIS IN HORSES.  
Chronic thickening of hind shanks.  
Iron tonics, with diuretics ; cold-water bandages.
870. EMPHYSEMA.  
Subcutaneous air swelling underneath the skin due to wounds.  
Puncture with point of sharp knife, and apply pressure.
871. ENTERITIS.  
Inflammation of the bowels.  
Give linseed oil, laudanum, chloral hydrate, morphia hypodermics.  
Hot applications to belly.
872. EPILEPSY.  
Fits in dogs.  
Keep animal steady ; douche head well with cold water.  
If from worms, give worm medicine.

## 873. EPISTAXIS.

Bleeding from the nostrils.  
Apply cold water to head ; plug nostrils with cotton-wool.  
Give tincture of iron in water to drink.

## 874. ERYSIPELAS.

Diffusive inflammation of the skin and connective tissue.  
Keep perfectly quiet ; give repeated doses of quinine.  
Offer generous diet.

## 875. EXOSTOSIS.

Bony tumour.  
Hot or cold applications and counter-irritants.

## 876. FALSE QUARTER.

Defect in the horny wall of the hoof from injury.  
Apply bar shoe ; blister coronet.

877. FARCY (*see* Glanders).

## 878. FEVER.

Various.  
High temperature ; quick breathing ; dullness.  
Put into well-ventilated, dry loose-box.  
Bandage legs ; put on clothing ; give nitrate water to drink.

## 879. FISTULA.

A tubular ulcer.  
Operation necessary ; dress with antiseptics.

880. FLATULENCE (*see* Colic).

## 881. FLEAS.

Wash with phenyle, izal, or chinisol solutions.

## 882. FLY-BLOW.

Common to wounds in sheep.  
Wash as for fleas ; dip as a preventive.

## 883. FOOT-ROT IN SHEEP.

Contagious inflammation of the feet with ulcerative sores.  
Remove loose horn ; dress with antiseptics and caustics.

## 884. FOUL IN FEET OF CATTLE.

Inflammation and ulcerations between the digits.  
Wash clean ; dress with antiseptics, and poultice.

## 885. FOUNDER—LAMINITIS.

Inflammation of the feet.  
Remove shoes ; put on poultices.

## 886. FRACTURE.

Broken bones.  
Put bones in position ; splints and bandage.

## 887. GANGRENE.

Mortification, or death of a part.  
Dress with antiseptics ; give quinine ; nutritious food.

## 888. GASTRITIS.

Inflammation of the stomach.  
Small dose of linseed oil and laudanum ; morphia hypodermics.  
Hot blankets rolled round the body.

## 889. GLANDERS IN HORSES.

Specific contagious disease.  
Nasal ulcers and discharge from the nose.  
Isolate and disinfect ; *dangerous*.

## 890. GLOSSITIS.

Inflammation of the tongue.  
Wash with boracic acid or chlorate of potash solutions.

## 891. GRAPES IN HORSES.

Inflammation of the skin of horses' heels, with enlarged growths.  
Wash with antiseptic solutions ; dress with powdered alum or blue vitriol.

## 892. GREASE.

Inflammation of the skin of horses' legs, with foetid discharge.  
Wash with disinfectants ; dust with boracic acid, iodoform, and charcoal.

893. GROGGINESS (*see* Navicular Disease).

## 894. HÆMATURIA.

Bloody urine from the urinary organs, due to disease or injury.  
Keep quiet ; give salt and sulphate of iron combined.

## 895. HÆMOALBUMINURIA OF RUMINANTS.

Red-Water (Muir-III).  
Give Epsom salts or common salt in water.  
Iron and vegetable tonics.

## 896. HÆMOPTYSIS.

Bleeding from the lungs.  
Perfect quiet ; cold compress round the chest.  
Give spirits in water when necessary.

897. HÆMORRHAGE (*see* Bleeding).

## 898. HÆMORRHAGE, POST-PARTUM.

Bleeding after parturition.  
Dash cold water over loins and pack wet cloths into the womb.  
Give tincture of iron in cold water as a drench.

## 899. HEPATITIS.

Inflammation of the liver.  
Saline aperients, with sedatives and small doses of calomel.

## 900. HERNIA.

Rupture ; displacement of bowels.  
Bandage and operation.

## 901. HOOSE.

Thread worms in windpipe.  
Keep indoors in comfortable quarters ; dry beds.  
Turpentine and oil ; fumigations ; nutritious diet.

## 902. HOVEN.

Distension of the paunch.  
Give linseed oil and turpentine.  
Puncture with trocar and cannula, or knife.

## 903. HYDATIDS ON BRAIN—STURDY.

Cœnurus Cerebralis.  
Watery tumour on the brain from tape-worm of the dog.  
Operation.

## 904. HYDROPHOBIA.

Rabies.  
A specific febrile disease produced by a virus, principally seen in the dog.  
Destroy.

## 905. HYDROTHORAX.

Water in the chest.  
Operation ; iron tonics.

## 906. INDIGESTION.

Dyspepsia, injudicious feeding.  
Mild aperient medicine, combined with vegetable tonics.  
When acute, hot cloths to the belly.

## 907. INFLAMMATION.

Acute, subacute, and chronic.  
Local treatment ; cold or hot applications to the part.  
Constitutional treatment : mild laxatives and fever medicines.

## 908. INFLUENZA.

Specific infectious febrile complaint of horses, of epizootic character.  
Isolate patient ; warm, comfortable box ; bandage legs and clothe body.  
Nitrate water to drink ; steam nostrils.

## 909. INTUSSUSCEPTION.

Telescoped gut (*see* Enteritis).

## 910. JAUNDICE.

Yellows ; derangement of the liver.  
Give saline laxatives, and small doses of calomel.

911. KENNEL LAMENESS (*see* Rheumatism).

## 912. KERATOMA.

Horny tumour on foot.  
Operation.

913. LAMINITIS (*see* Founder).

## 914. LARYNGITIS.

Inflammation of the larynx.  
Comfortable box ; warm clothing.  
Steam nostrils ; apply stimulating embrocation to throat.  
Nitrate water to drink.

## 915. LEUCORRŒA.

Whites ; chronic inflammation of the vagina and womb.  
Antiseptic injections and tonic medicines.

## 916. LICE.

Wash skin with phenyle, izar, or chinosol solutions, or with decoction of stavesacre.

## 917. LOCKJAW.

Continuous muscular spasms due to a microbe.  
Put in dark loose-box ; keep perfectly quiet ; offer cold hay tea.  
If from a wound, dress with antiseptics.

## 918. LOUPING-ILL IN SHEEP.

Derangement of the nervous system.  
Isolate ; give bromide of potassium.  
Apply salt to pastures as a preventive.

## 919. LUXATION.

Partial displacement of patella generally.  
Put in loose-box ; keep quiet, and blister.

## 920. LYMPHANGITIS.

Weed.  
Cold-water bandages to leg.  
Give linseed oil, followed by diuretics.

## 921. LYMPHATICS, INFLAMED.

From pricks and injuries.  
Foment parts with hot water, or apply cold-water bandages.  
Give saline aperient medicines.

## 922. MALADIE DU COÛT OF HORSES—DOURINE.

Covering disease.  
A specific disease of the male and female genital organs of a chronic nature.  
Communicated at time of service.  
Wash with disinfectants.  
Give chlorate of potash and quinine, or arsenic.

## 923. MALLENDERS AND SALLENDERS.

Chronic inflammation of the skin, back of knee, and front of hock joint.  
Apply oleate of mercury.

## 924. MAMMITIS—GARGET.

Inflammation of the udder.  
Draw teats ; apply camphorated oil.  
Give small dose of antiseptic laxative medicine.

925. MANGE (*see* Acari).

## 926. MEGRIMS.

Giddiness.  
Perfect rest and quietness, and laxative medicine.

## 927. MELANOSIS.

Tumour of a cancerous nature, seen in grey horses.  
Operation.

## 928. MENINGITIS.

Inflammation of the coverings of the brain.  
Put into dark box ; keep perfectly quiet.  
Give laxative medicine and nerve sedatives.

## 929. METRITIS.

Inflammation of the womb.  
Inject warm water containing disinfectants.  
Give linseed oil and laudanum.

## 930. MURRAIN.

Foot and mouth disease.  
A contagious eruptive fever, affecting cows, sheep, and pigs.  
Discharge from mouth ; smacking of the lips.  
Give chlorate of potash in drinking-water.

## 931. MYOSITIS.

Inflammation of the muscle.  
Rest ; fomentations ; alterative laxatives.

## 932. NASAL GLEET—OZÆNA.

Discharge from the nostril.  
Inject with chinisol solution, also iodoform ; give iron tonics.

## 933. NAVICULAR DISEASE.

Grogginess ; ulceration of the navicular bone.  
Apply cold wet swabs to feet ; shoe with indiarubber pads.

## 934. NECROSIS.

Death of bone.  
Operation.

## 935. NETTLE RASH—URTICARIA.

Howks, or blains.  
Give carbonate of soda in water and spirit, or turpentine and oil.

## 936. NEPHRITIS.

Inflammation of the kidneys, various forms.  
Perfect rest ; hot clothes to the loins.  
Give small doses linseed oil and laudanum.

## 937. OMPHALITIS.

Inflammation and suppuration of the navel cord.  
Open with a knife, and apply antiseptic dressing.  
Put on a cloth wrung out of hot water, and support with a bandage around the body.  
Give mild aperients.

## 938. OPEN JOINT.

Rest ; cold-water irrigation ; blisters.

## 939. OPHTHALMIA.

Inflammation of the eyes ; simple and periodic.  
Remove foreign body, if one.  
Apply boracic acid lotion ; keep in dark box ; give saline laxatives.

## 940. ORCHITIS.

Inflammation of the testicles.  
Hot fomentations ; belladonna applications ; saline alterative medicine.

## 941. OSTITIS.

Inflammation of the bones.  
Cold or hot applications ; perfect rest ; blistering and firing.

942. OTORRHOEA (*see* Canker of the Ear).

## 943. PARALYSIS.

Loss of sensation and motion.  
Mainly due to lightning shock.  
Keep quiet ; give bromide of potassium.

944. PATELLA, DISLOCATION OF (*see* Luxation).

## 945. PERICARDITIS.

Inflammation of the covering of the heart.  
Put in loose-box ; keep perfectly quiet.

## 946. PERIOSTITIS.

Inflammation of the covering of the bone.  
Perfect rest ; cold or hot water applications ; blisters.

## 947. PERITONITIS.

Inflammation of the lining of the belly.  
Give laudanum and linseed oil ; morphia hypodermics.  
Woollen rugs, wrung out of hot water, round the body.

## 948. PHARYNGITIS.

Inflammation of pharynx ; sore throat.  
Put into well-ventilated box ; steam nostrils.  
Apply stimulating liniment to throat.  
Give chlorate of potash in drinking-water.

## 949. PHLEBITIS.

Inflammation of a vein.  
Apply blisters ; dress with antiseptics.

## 950. PHRENITIS.

Inflammation of the brain.  
Bleeding ; purgative medicines ; nerve sedatives.  
Cold applications to the head.

## 951. PLEURISY.

Inflammation of the lining of the chest.  
Bleeding ; laxatives ; hot cloths to the chest.

## 952. PLEURO-PNEUMONIA (COW).

Specific contagious inflammation of the lungs.  
*Treatment not allowed ; under the Contagious Diseases (Animals) Act.*

## 953. PNEUMONIA.

Inflammation of the lungs.  
Put in well-ventilated loose-box.  
Apply hot blankets to the chest.  
Give linseed oil, spirits of nitre, and tartar emetic.

## 954. PUMICED FOOT IN THE HORSE.

Convexity and weakness of the sole.  
Shoe with bar shoe and leather soles.

## 955. PURPURA HÆMORRHAGICA IN THE HORSE.

A febrile affection accompanied by extensive swellings on limbs and body.  
Purple patches on the lining of the nose.  
Well-ventilated loose-box ; warm clothing.  
Give chlorate of potash in drinking-water.

## 956. PYÆMIA.

Blood-poisoning.  
Formation of abscesses in various parts of the body.  
Wash with antiseptics and give quinine.

## 957. QUITTOR.

A fistulous sore in coronet of the horse's foot.  
Wash with antiseptic agents ; caustics ; blister.

## 958. RHEUMATISM.

A painful malady of the muscles, tendons, and joints.  
Apply stimulating applications.  
Give salicylate of soda and bicarbonate of potash.

## 959. RICKETS.

Softening of the bone.  
Nourishing diet ; cod-liver oil ; lime-water ; Parrish's syrup.

## 960. RINDERPEST.

Cattle plague.  
*Treatment not allowed.*

## 961. RINGBONE.

Bony enlargement on pastern joint.  
Rest ; cold applications ; blister ; put on bar shoe.



## 962. RINGWORM.

Itchy, scaly and hairless patches on different parts of the body.  
Isolate animals and wash with phenyle and water.  
Apply carbolic oil, or tar ointment and sulphur.

## 963. ROARING.

Wasting of the muscles of the larynx, giving rise to peculiar noise.  
Operation in bad cases.

## 964. SADDLE-GALLS.

Sores, the result of badly-fitting harness.  
Relieve pressure ; wash with antiseptics ; apply white lotion.

## 965. SAND-CRACK.

Fissure in horn of hoof.  
Remove pressure ; dress with tar ointment, and put leather strap round hoof.

## 966. SEPTICÆMIA.

Septic blood-poisoning.  
If from wound, wash with antiseptics ; give quinine and generous diet.

## 967. SARCOMATOUS TUMOURS.

Cancerous tumours, generally on the face.  
Operation.

## 968. SCAB IN SHEEP.

Due to parasites.  
Dip sheep in non-poisonous dip.

## 969. SEEDY TOE IN HORSES.

Secretion of degenerate horn in the walls of the hoof.  
Remove shoe ; operation and special dressing.

## 970. SHIVERING.

A nervous affection and twitching of the muscles.  
Give bromide of potassium.

## 971. SHOULDER SLIP.

Sprain, with wasting of the external muscles of shoulder-blade.  
Blister ; long rest, and a run on grass.

## 972. SIDE BONE.

Ossification of the lateral cartilages.  
Cold applications ; remove pressure ; put on bar shoe ; blister.

## 973. SORE SHINS.

Inflammation of shin bones.  
Long rest ; cold or hot water bandages.

## 974. SPLINT.

Bony exostosis on shank-bones.  
Rest ; cold-water bandages ; blister.

975. SPEEDY CUT (*see* Brushing).

976. **SPRAINS.** 99  
 Laceration of tendons and ligaments.  
 Rest ; high-heeled shoe ; cold-water bandages ; blister, and firing.
977. **STOMATITIS PUSTULOSA.** 99  
 Inflammation and ulceration of the lining of the mouth and skin of face.  
 Wash with boracic acid lotion ; give chlorate of potash.
978. **STRANGLES.** 99  
 Febrile suppurative disease, with abscesses between jaws and throat. 99  
 Apply mustard and water to the parts.  
 Give chlorate of potash in drinking-water.  
 Steam the nose with medicated watery vapour.
979. **STRINGHALT.** 99  
 Nervous affection and twitching of the muscle, with sudden clicking of one or more legs. 99
980. **STURDY** (*see* Hydatids).
981. **SWINE FEVER.** 99  
 An infectious disease accompanied by great depression and discoloration of the skin.  
 Isolation ; *treatment not allowed.* 99
982. **SYNOVITIS.**  
 Inflammation of membranous sac covering joints. 99  
 Treatment same as for Arthritis. 99
983. **TAPE-WORM** (*see* Worms). 99
984. **TEATS OBSTRUCTED.** 100  
 Pass teat syphon ; draw off milk. 100
985. **THOROUGHPIN.**  
 Bursal distension on sides of hock.  
 Rest ; high-heeled shoe, and pressure by indiarubber bandage and truss.
986. **THROMBOSIS.**  
 Clot of blood in artery or vein.  
 Rest ; mild aperients.  
 Iodide of potassium. 100
987. **THRUSH** (*see* Aphtha).
988. **THRUSH IN HORSE'S FROG.**  
 Fœtid discharge from cleft.  
 Wash with antiseptics or salt and water.
989. **TICKS.**  
 Dip with non-poisonous dips.

990. TREAD.  
Bruise of the coronet.  
Cold applications ; if skin broken use antiseptics.
991. TUBERCULOSIS.  
Specific disease, local or generalized, due to bacilli.  
Test with tuberculin.  
Give cod-liver oil.
992. TYMPANITES (*see* Colic, Hoven).
993. ULCERS.  
Various.  
Astringent antiseptic dressings.  
Good, nourishing diet, with iron tonics ; blister.
994. URTICARIA (*see* Nettlerash).
995. VAGINITIS.  
Inflammation of the vagina.  
Inject antiseptic solutions ; give linseed oil and laudanum.
996. VARIOLA OVINA.  
Small-pox in sheep.  
Isolate animals.
997. VOLVULUS.  
Twist of the bowel (*see* Enteritis).
998. WARTS (*see* Angle Berries).
999. WEED (*see* Lymphangitis).
1000. WHISTLING IN HORSES.  
Modified form of roaring.
1001. WORMS.  
Great variety infesting various parts of the body.  
Nematoda (round and thread worms), as ascarides, oxyures, strongyli.  
Trematoda (flat worms).  
Cestoda—taenia, tape-worms.  
Give turpentine and linseed oil.  
Salt, sulphate of iron, and flowers of sulphur.
1002. WOUNDS.  
Wash with antiseptics ; stop bleeding with pressure ; stitch up.

## APPENDIX B

### MEDICINES : THEIR TERMS, ACTIONS, FORMULAS AND DOSES

1003. On account of the large number of diseases that are now found to arise from the presence of pathogenic or disease-producing germs in the fluids and tissues of the body, the administration of medical agents has, during the last twenty years, undergone a great change. Medical agents act both *locally* and *generally*, and are much influenced in their action by climate, temperature, habit, surroundings, susceptibility of the patient, and the nature of the disease. Some medicines, again, have special actions on certain structures and organs of the body, but their influence varies considerably in different classes of animals. To meet these conditions, medicines are, therefore, compounded and used in a variety of forms.
1004. The ALLOPATHIC form is the oldest and most general in use, and in it drugs are employed in certain definite proportions in accordance with their action, and they are given by the mouth. The *Homœopathic* form, or *Homœopathy*—'like cures like'—is seldom used in 'veterinary practice'; drugs, however, under this system, are administered in the form of globules and in infinitesimal doses.
1005. Medical preparations are, as a rule, given by the mouth in the form of *Balls*, *Boluses*, *Pills*, and *Draughts*, or they are injected into the bowels by an *enema*. *Hypodermic Injections*—that is, injections of certain medicines under the skin—are now extensively practised with good results; medical and various other preparations are also frequently directly injected into the blood and into the windpipe.
1006. The peculiar actions of some of the drugs on the living body are known under special terms, such as *Alteratives*, *Anæsthetics*, *Anodynes*, *Antiseptics*, *Aperients*, etc.
1007. ALTERATIVES have an extensive range, and include the various preparations of the bromides, chlorides, iodides, sulphides, and the alkaline carbonates, and also the mercurial, arsenical, and vegetable extracts. It is not exactly known in what manner a number of them establish

their action on the tissues of the body, but it is thought that they displace and remove effete debris from the system, and at the same time supply the necessary normal constituents to the tissues. Alteratives have been in common use for ages past. The best of all the alteratives are, however, plenty of fresh air, proper ventilation and drainage, good sweet food, and clean bedding; also clipping, exercise, and good grooming in winter. Raw linseed oil and cod-liver oil, from  $\frac{1}{2}$  ounce to 2 ounces, given once a day, have a splendid alterative action on horses and cows. For *Sheep*, one-fourth of the quantity may be given. Grass and other green foods are the best alteratives during summer. Winter, however, is the time when alterative medicines are usually given to the *Horse*. As an alterative for the *Pig*, 1 drachm each of carbonate of soda and flowers of sulphur can be given daily in the food. For the *Dog*, the dose ought to be 1 to 2 drachms of Parrish's syrup or Fellows' syrup of hypophosphites.

1008. **ANÆSTHETICS** are agents that produce insensibility, and control muscular action, and may be said to act both generally and locally. *General Anæsthetics* produce insensibility by the inhalation through the nostrils of the fumes of NITROUS OXIDE, CHLOROFORM, and ÆTHER, or a mixture of the two latter. *Local Anæsthetics* produce non-sensitiveness in the parts to which they are applied. A 5 per cent. solution of COCAINE, applied with a brush or cotton-wool, answers best. Carbolic acid, aconite, and extreme cold are also occasionally used.
1009. **ANODYNES** relieve pain, and act both locally and generally. The *Local* agents are for outward application, and are many, such as hot and cold water applications, belladonna, cocaine, menthol, tar, carbolic acid, blisters, etc. The *general* agents are either given by the mouth or—hypodermically—by the skin. Those most generally given by the mouth are opium, chloral hydrate, spirits, also turpentine, and, hypodermically, morphia and atropine.
1010. **ANTHELMINTICS, VERMICIDES, AND VERMIFUGES**, are worm annihilators and expellers. The *Vermicides* are supposed to kill the worms, while the *Vermifuges* purge the parasites from the inside wall of the bowels and expel them. Green food in the early summer months is a good vermifuge—particularly for *Bots* in the horse.
1011. **ANTISEPTICS** retard and prevent the development of disease-producing germs, while disinfectants kill them outright; therefore an antiseptic cannot take the place of a disinfectant, but certain disinfectants, when diluted, will act as antiseptics. Antiseptics act both *externally* and *internally*, but in the latter case they are very uncertain in their action, as disease-producing germs are difficult to deal with when present within the living body. Common salt, hyposulphite of soda, and quinine are amongst the best and safest antiseptics for internal use. *External* antiseptic agents are numerous. Carbolic acid is the agent mostly used in veterinary practice, when diluted—say, 1 part of the acid with 10 to 60 parts of glycerine, olive oil, or water; phenyle, chinocol, and Sanitas are occasionally used, and are diluted according to the purpose for which they are required.

1012. **ANTISPASMODICS** are remedies that relieve or prevent spasm or cramp of the muscular fibres. The list of such agents is very great. *Those used externally* are cold and hot applications, friction, massage, blood-letting, and any form of counter-irritation. *Those used internally* are spirits, laudanum, morphia, chloral hydrate, turpentine, camphor, etc. Hypodermic injections of morphia and atropine are used, also inhalations of chloroform and æther, and watery vapours of essential oils—eucalyptus oil, camphor, etc.
1013. **APERIENTS** (*see* Purgatives).
1014. **AROMATICS** (*see* Carminatives).
1015. **ASTRINGENTS** check and arrest too abundant secretions, and cause the parts to contract and condense. The materials used are the mineral and vegetable acids, mineral salts, chalk, oak bark, alum, turpentine, and opium.
1016. **ANTIPERIODICS** are medicinal agents that prevent or lessen the active symptoms of certain complaints, of a recurring or intermittent nature. For these quinine, arsenic, iodine, and the bromides, answer best.
1017. **ANTIPYRETICS** (*see* Febrifuges).
1018. **BLISTERS, COUNTER-IRRITANTS, RUBEFACIENTS, VESICANTS.**—These agents differ very much in their action and intensity, according to the materials used. They cause heat, pain, redness and swelling of the part to which they are applied, and thus relieve the pain, or the congestion and inflammation in the more deep-seated parts, and they also promote absorption of adjacent enlargements. A number of substances are used as *Counter-irritants*. From 2 to 3 ounces of mustard mixed in 1 pint of cold water make a good simple counter-irritant for the throat in *common cold, pharyngitis, and laryngitis*. For applying to the sides of the chest in *bronchitis, pneumonia*, etc., double the strength of the above must be used. *Blisters* for horses and cattle are used in the form of liquids and ointments, and of these there are various preparations.
1019. **CARMINATIVES, AROMATICS, CORDIALS AND STOMACHICS.**—These articles, like antispasmodics, are used to stimulate the stomach and intestinal canal into action, also to condense gases and to expel flatus. The aromatic seeds and the essential oils—as oil of mint—are used for this purpose. As a general *cordial or stomachic*, the following mixture is useful : Equal parts of ginger, gentian, caraway seeds, aniseed, coriander seeds, and pimento ; grind very fine, and mix well together. For the *horse and cow* from 3 to 5 ounces of the mixture may be given in 3 gills of *warm ale* or treacle gruel, as a warming drench. For *sheep* give one-fourth of this dose. Four ounces of this cordial, if added to a dose of salts, assist the latter greatly in its action.
1020. **CATHARTICS** (*see* Purgatives).
1021. **CAUSTICS, ESCHAROTICS, STYPTICS.**—These agents are generally used to arrest excessive granulations in wounds, or to stimulate healthy action in indolent ulcers ; also to remove warty excrescences, and they are used

both in solid and liquid forms. Nitrate of silver (caustic), sulphate of copper, sulphate of zinc, etc., can be applied in fine powder or dissolved in water. Tincture of iron and tincture of benzoin, carbolio acid, turpentine, etc., make good styptics—*i.e.*, arresting bleeding; and for this the hot iron is also at times used with good effect.

1022. COUNTER-IRRITANTS (*see* Blisters).

1023. DECOCTIONS, INFUSIONS, TINCTURES, are medical solutions prepared in different ways. *Decoctions* are made by cutting or bruising the roots, seeds, or leaves of medicinal plants, boiling them in distilled water for a certain time, and straining through muslin, a little spirits being added to preserve them. *Infusions* are prepared by digesting bruised vegetable products in hot water and straining, also adding a little spirit. *Tinctures* are made by macerating drugs in spirits, or spirits and water, for a certain period, and then filtering. When these are properly prepared, they are all useful and handy forms of medical preparations.

1024. DEODORIZERS are agents that disguise, neutralize, or destroy bad smells, such agents being chloride of lime, mercury, carbolized lime, strong acids, chinosol, charcoal, moss-litter, etc.

1025. DEMULCENTS, EMOLLIENTS, LUBRICANTS.—These agents have a semi-mechanical action. They protect raw surfaces from external influences, also *soothe*, *soften*, and *relax* the parts to which they are applied. They include flour, starch, treacle, milk, cotton-wool, Fuller's earth, oils, fats, vaseline, glycerine, etc. Applications of cloth wrung out of cold or hot water come under this head.

1026. DIAPHORETICS, SUDORIFICS.—These act on the sweat-glands of the skin, increasing their action, and causing the animal to perspire. It is difficult to get the horse or cow to sweat. I have found that putting the animal into a close box and giving a vapour bath is the best plan, or another way is to damp the body all over with cold water, covering up with a sheet wrung out of the water, over which dry woollen rugs and water-proof sheets are put, with plenty of cold water given to drink. From 1 to 2 ounce doses of spirits of nitre given in 1 pint of cold water at the same time will assist the action.

1027. DISINFECTANTS.—A large number of simple and compound articles are used as disinfectants, but nothing beats a good supply of fresh air, bright sunshine, thorough cleanliness, good ventilation, and effective drainage. Boiling water, steam, a good fire, the burning of disease-producing products, chemical agents, such as carbolized lime, mineral salts, and the preparations of chlorine, also Condy's fluid, are all good disinfectants.

1028. DIURETICS.—These stimulate the kidneys to extra action, and cause an increased secretion of urine, washing out the kidneys, as it were, also removing waste products from the system, and dropsical swellings from the legs and depending parts of the body. The substances most commonly used for this purpose are: Turpentine, nitrate of potash, resin, spirits of nitre, oil of juniper, etc.

1029. **ECBOLICS, PARTURIENTS.**—These act upon the womb, and cause it to contract and expel its contents, or they arrest hæmorrhage from the womb. Excepting for the bitch, these agents are rarely used in veterinary practice. Ergot of rye is supposed to be the best.
1030. **EMBROCATIONS, LINIMENTS.**—These are stimulating counter-irritants used for external application for sprains, bruises, sore throats, etc. They increase the action of the absorbent vessels, and also hurry forward suppurative processes. There are numerous formulas for the making of liniments and embrocations.
1031. **EMETICS** are articles used to cause vomiting and emptying of the stomach. Those used in veterinary practice are for dogs and cats only. One teaspoonful each of mustard and common salt, given in half a tea-cupful of warm water, generally answers for a dog.
1032. **EMOLLIENTS** (*see* Demulcents).
1033. **EXPECTORANTS** assist in the removal of the secretions from the air-passages, and for this purpose ammonia, camphor, turpentine, and balsams can be used; but the best expectorant for the horse or cow in catarrhal and lung affections is the inhalation of warm vapour, arising from steamed hay in the bottom of a pail, over which some camphor shavings, or oil of eucalyptus, and 1 quart of boiling water have been sprinkled.
1034. **ESCHAROTICS** (*see* Caustics).
1035. **FEBRIFUGES, ANTIPIRETICS.**—These agents are numerous, and have different actions on various parts of the body, according to the cause of the fever, but are generally used for lowering the temperature of the body. In many cases in the horse and cow bleeding answers the quickest, and with good effect; in other cases purgatives, when used judiciously, greatly assist in lowering the temperature. Sponging the body with cold water, and putting on a sheet wrung out of the water, and covering up with woollen rugs, have also a good effect. The medical agents used are spirits of nitre, antimony, camphor, salicylates, carbolic acid, quinine, etc. In sympathetic fever, from  $1\frac{1}{2}$  to 3 ounces of hyposulphite of soda can be given every six hours as a drench, or in drinking-water. Sulphate of quinine or salicylate of soda can also be given.
1036. **GERMICIDES, PARASITICIDES, INSECTICIDES.**—These are preparations that destroy parasitic or insect life. Those most commonly used are carbolic acid and carbolic preparations generally, such as phenyle and sheep-dip preparations; also chlorides, bromides, and iodides. The inhalation of chlorine, sulphur, or iodide fumes acts as a parasiticide to the small thread-worms in the bronchial tubes in young calves and lambs when affected with hoose (*see* Worms).
1037. **HYPNOTICS AND SEDATIVES** are used to induce sleep and relieve pain. The substances commonly used are laudanum, morphia, chloral hydrate, bromide of potassium, and spirits. Excepting in the dog and cat, sleep is difficult to induce in the larger animals.



1038. INFUSIONS (*see* Decoctions).
1039. INSECTICIDES (*see* Germicides).
1040. LOTIONS, REFRIGERANTS (*Cooling Lotions*).—These watery solutions of drugs are numerous, and are generally used externally. They cool the part to which they are applied, allay pain, and check the circulation, and are used after fomentations on swellings and bruises, such as capped elbow and hock.
1041. LUBRICANTS (*see* Demulcents).
1042. OINTMENTS are semi-solid, paste-like substances, made by incorporating certain medical agents with lard or vaseline, and these may be mixed on a slab, or in a mortar. Ointments consisting of lard, wax, turpentine, resin, etc., are melted over a slow fire with medical agents stirred in.
1043. PARASITICIDES (*see* Germicides).
1044. PARTURIENTS (*see* Echolics).
1045. PURGATIVES, CATHARTICS, LAXATIVES, APERIENTS.—There are a great many medical agents that are used as such. They stimulate the action and increase the secretion of the lining membrane of the bowels, and empty the alimentary canal. For the *Horse*, Barbadoes aloes is most generally used, also castor and linseed oils, Epsom and Glauber salts. For the *Cow* and *Sheep*, Epsom and Glauber salts, linseed or castor oil. To the *Pig*, jalap and croton oil are given, and to the *Dog*, castor oil and syrup of buckthorn. For full doses, see the table. For *laxative or aperient* doses, from one-fourth to one-fifth of the full dose can be used. CROTON OIL *should only be given to the pig. It is highly dangerous to the other domestic animals.*
1046. REFRIGERANTS (*see* Lotions).
1047. RESTORATIVES (*see* Tonics).
1048. RUBEFACIENTS (*see* Blisters).
1049. SEDATIVES (*see* Hypnotics).
1050. STIMULANTS are various. They have different actions on different organs of the body, and are used both externally and internally. *Externally*, cold and hot applications, embrocations, liniments, blister, etc., have a stimulating effect. *Internally*, spirits, ammonia, cold water, tea, coffee, etc., are used. *Sedatives* generally have a more or less stimulating action at first, but this is followed by a sedative reaction (*see* Carminatives.)
1051. STYPTICS (*see* Caustics).
1052. STOMACHICS (*see* Carminatives).
1053. SUDORIFICS (*see* Diaphoretics).
1054. TINCTURES (*see* Decoctions).

1055. **TONICS, ALTERNATIVES, AND RESTORATIVES.**—These agents give tone and impart strength to the portions of the body for which they are specially adapted. They are usually given when the system or any one or more parts of it become weakened and relaxed from overexertion. The tissues of the body, when not diseased, have an innate power within themselves of replacing the waste, therefore the essentials most needed as a tonic and restorative are a good supply of fresh air, pure water, sound and proper food, good ventilation, drainage, and clean beds. *Restorative tonics* are vegetable bitters and aromatics, combined with some of the alkalies, and also the mineral acids and mineral salts.
1056. **VERMICIDES** (*see Anthelmintics*).
1057. **VERMIFUGES** (*see Anthelmintics*).
1058. **VESICANTS** (*see Blisters*).

### SIMPLE FORMULAS REFERRED TO IN THE VARIOUS PARAGRAPHS.

The following medicines and doses are for adult animals, therefore other doses must be regulated according to age and size of animal :

#### 1059. ALTERNATIVE POWDER FOR HORSES (GENERAL).

I.	Epsom Salts	..	..	..	from 1 to 2 oz.
	Saltpetre	..	..	..	„ 2 to 4 dr.
	Flowers of Sulphur	..	..	..	„ 3 to 6 dr.
	Carbonate of Iron	..	..	..	„ 1 to 2 dr.

Mix together and give in a mash two or three times a week during winter.

#### ALTERNATIVE TONIC MEDICINE FOR HORSE OR COW.

II.	Chloride of Sodium (Common Salt)	..	..	..	3 dr.
	Powdered Nux Vomica	..	..	..	1 dr.
	Exsiccated Iron	..	..	..	1 dr.

Mix for one dose, to be given once a day in the food.

Par. 30, 442, 245, 456.

#### ALTERNATIVE COUGH MEDICINE.

#### III. *Fowler's Solution of Arsenic.*

In doses from 1 to 2 tablespoonfuls given once a day in the food.

Par. 520.

#### 1060. ANTISEPTIC WASHES AND DRESSINGS FOR WOUNDS.

I.	Phenyle, or Jeyes' Fluid	..	..	..	1 oz.
	Cold Water	..	..	..	2½ pt.

Mix, and apply to the wound with a sponge.

Or—

II.	Chinosol	..	..	..	45 gr.
	Water	..	..	..	1 pt.

Mix, and apply with a sponge.

## CARBOLIC MIXTURE.

III.	Carbolic Acid	..	..	..	1 oz.
	Olive Oil	..	..	..	9 oz.

Mix, and apply with a feather to the wound.

Pars. 128, 131, 133, 148, 206, 285, 335, 337.

## ANTISEPTIC OR BLACK OIL MIXTURE.

IV.	Turpentine	..	..	..	1½ oz.
	Sulphuric Acid (strong)	..	..	..	2 dr.
	Linseed Oil	..	..	..	10 oz.

Put the turpentine into a large jar, and add the acid very carefully, as a strong chemical action takes place when the two meet; then add the linseed oil. Apply to wounds with a feather.

Par. 682.

## WHITE LOTION.

*Caustic Antiseptic Healing Lotion*, for wounds generally, such as broken knees, sore backs, shoulders, etc.

V.	Sulphate of Zinc	..	..	..	2 dr.
	Sugar of Lead	..	..	..	2 dr.
	Cold Water	..	..	..	2 pt.

Mix, and apply to the wound once a day with a clean sponge.

Pars. 30, 129, 132, 203, 668, 670, 671, 672, 674.

## CAUSTIC POWDER FOR WOUNDS AND RAW SURFACES.

VI.	Finely Powdered Blue Vitriol	..	..	1 oz.
	" " Charcoal	..	..	1 oz.
	" " Iodoform	..	..	1 dr.

Mix, and dust over wounds as required.

Pars. 129, 130, 132, 148, 203.

## IODOFORM DRESSING.

VII.	Iodoform	..	..	..	1 dr.
	Oak Varnish	..	..	..	1 oz.

Mix together, and apply to the wound with a brush, over which place a layer of cotton-wool, and secure with a bandage.

Pars. 130, 148.

## 1061. CHARGE FOR JOINTS.

	Black Pitch	..	..	..	3 lbs.
	Green Tar (Stockholm)	..	..	..	1½ lbs.

Melt over a slow fire, stir well together, and smear over joint when nearly cold.

Pars. 113, 155, 156, 157.

## 1062. COLIC OR GRIPE DRAUGHT FOR HORSES.

I.	Linseed Oil	..	..	..	15 oz.
	Laudanum	..	..	..	2 oz.
	Spirits of Nitre, or Turpentine	..	..	..	2 oz.

Mix, and give as one dose.

The following may also be given :

II.	Carbonate of Ammonia	..	..	..	4 dr.
	Chloral Hydrate	..	..	..	4 dr.
	Carbolic Acid	..	..	..	30 dp.

Mix with a little linseed meal, and make into a ball.

Pars. 243, 255, 256, 264, 306.

#### 1063. COOLING DIET FOR FEVERS.

Green food (grass, tares, vetches, clovers, lucerne, sainfoin), carrots, turnips, and potatoes, warm mashes of bran or boiled barley and bran, also cold water, hay tea, milk, linseed jelly, and milk to drink.

Pars. 38, 41.

#### 1064. COUGH MIXTURE FOR HORSE (GENERAL).

I.	Chlorodyne	..	..	..	4 oz.
	Glycerine	..	..	..	4 oz.

Mix, and give 2 tablespoonfuls night and morning in the food.

Par. 499.

#### COUGH BALL FOR HORSE.

II.	Powdered Carbonate of Ammonia	..	..	2 dr.
	„ Camphor	..	..	1 dr.
	„ Squills	..	..	1 dr.
	„ Digitalis	..	..	$\frac{1}{2}$ dr.

Mix, and make into a ball with a little honey or treacle ; give one each night.

Pars. 499, 519, 520.

#### COUGH PILLS FOR DOGS.

III.	Carbonate of Ammonia	..	..	36 gr.
	Powdered Squills	..	..	30 gr.
	„ Camphor	..	..	30 gr.
	„ Digitalis	..	..	18 gr.

Mix into a mass with a little honey, and divide into twelve pills ; give one every day.

Pars. 529, 531.

#### 1065. DIARRHŒA MIXTURE FOR HORSE OR COW.

I.	Carbonate of Magnesia	..	..	4 dr.
	Carbonate of Soda	..	..	4 dr.
	Aromatic Spirits of Ammonia	..	..	4 dr.
	Tincture of Ginger	..	..	4 dr.
	Chlorodyne	..	..	4 dr.

Mix, and give in 3 gills cold water, and repeat every eight hours if necessary. For DYSENTERY, from 30 to 60 drops of oil of cloves, creosote, or carbolic acid can be added to this mixture.

Pars. 265, 266, 310, 313.

#### DIARRHŒA MIXTURE FOR PIG AND DOG.

II.	Subnitrate of Bismuth	..	..	10 gr.
	Carbonate of Soda	..	..	40 gr.
	Carbonate of Magnesia	..	..	40 gr.

Mix, and give in warm milk.

Pars. 275, 282.

## GREGORY'S MIXTURE, FOR CALVES IN WHITE SCOUR.

III.	Carbonate of Soda	..	..	..	2 oz.
	Carbonate of Magnesia	..	..	..	2 oz.
	Powdered Rhubarb	..	..	..	1 oz.
	Ginger	..	..	..	1 oz.

Mix, and give 1 tablespoonful night and morning in milk.

Par. 335.

## 1066. EMBROCATION, OR LINIMENT.

I.	Gum Camphor	..	..	..	2 dr.
	Turpentine	..	..	..	2 oz.
	Colza Oil	..	..	..	5 oz.
	Strong Liquid Ammonia	..	..	..	3 dr.
	Liquor Potassæ	..	..	..	3 dr.

Dissolve the camphor in the turpentine, then add the other ingredients, and shake well together and apply externally.

Pars. 238, 500, 503; 529.

## BLISTERS FOR GENERAL USE.

## LIQUID FLY BLISTER.

II.	Powdered Cantharides	..	..	..	2 dr.
	Turpentine	..	..	..	4 oz.
	Colza Oil	..	..	..	4 oz.

Mix, and heat in a water-bath. To be shaken up and well rubbed into the parts where required. This can be made weaker by adding together equal parts of this liquid blister and colza oil. When so diluted, it makes a good counter-irritant for sore throats.

Par. 500.

## BINIODIDE OINTMENT.

III.	Biniodide of Mercury	..	..	..	1 dr.
	Lard or Vaseline	..	..	..	7 dr.

Mix well together. This is suitable for pars. 159, 237, 509.

## 1067. FEVER DRENCH FOR HORSE OR COW.

I.	Acetate of Ammonia, Dilute	..	..	..	3 oz.
	Spirits of Nitre	..	..	..	1 oz.
	Sulphuric Æther	..	..	..	$\frac{1}{2}$ oz.
	Infusion of Gentian	..	..	..	$\frac{1}{2}$ oz.

Mix, and give in 1 pint of cold water as a drench twice or thrice a day.

Pars. 38, 40, 511.

## SALINE APERIENT FEVER MEDICINE FOR HORSE OR COW.

II.	Epsom or Glauber Salts	..	..	..	2 oz.
	Nitrate of Potash (Saltpetre)	..	..	..	3 dr.
	Cream of Tartar	..	..	..	3 dr.

Mix, and give as a drench in 1 pint of cold water; or in drinking-water or cold hay tea, two or three times a day.

Pars. 38, 40, 70, 200, 205, 662, 663, 668, 670, 810.

## ANTISEPTIC FEVER DRAUGHT FOR HORSE OR COW.

- III. Sulphate of Quinine .. .. 1 dr.  
 Hydrochloric Acid .. .. 20 dp.

To be mixed in 1 pint cold water, and given as a drench twice a day, with 2 drachms of chlorate of potash in the drinking-water.

Pars. 41, 200, 205.

## ANTISEPTIC FEVER POWDERS FOR COW.

- IV. Hyposulphite of Soda .. .. 2 oz.  
 Exsiccated Iron .. .. 1 dr.  
 Mixed Carminatives (*Par.* 1019) .. .. 3 oz.

Mix, and give in 1 quart of thin gruel night and morning.

*Par.* 807.

## FEVER POWDERS FOR RHEUMATISM, FOR HORSE AND COW.

- V. Salicylate of Soda .. .. 2 dr.  
 Bicarbonate of Potash .. .. 3 dr.

Mix, and give in the food night and morning.

Pars. 142, 143.

## AMMONIA NITRATED WATER.

- VI. Carbonate of Ammonia .. .. 3 dr.  
 Nitrate of Potash .. .. 3 dr.

Dissolve in a pail of cold water, or cold hay tea, and offer animal to drink, for general fever purposes.

Pars. 441, 444.

## 1068. LIVER OR ALTERNATIVE PILLS FOR DOGS.

- Blue Pill Mass .. .. 1 dr.  
 Powdered Aloes .. .. 1 dr.  
 Powdered Rhubarb .. .. 1 dr.

Mix, and make into twelve pills, and give one every third day.

Pars. 529, 531.

## 1069. LOTIONS, REFRIGERANTS.

A simple refrigerant can be readily made as follows :

- I. Saltpetre .. .. 1 oz.  
 Common Salt .. .. 1 oz.  
 Cold Water .. .. 1 pt.  
 Vinegar .. .. 1 pt.

Dissolve the salt and saltpetre in the water, then add the vinegar. Shake well up, and apply a little to the affected parts, after hot fomentations.

Pars. 147, 158.

An *Antiseptic Lotion* for sore and ulcerated mouths can be made as follows:

- II. Condy's Fluid .. .. 1 tablespoonful  
 Cold Water .. .. 1 pt.  
 Or—  
 III. Boracic Acid .. .. 2 dr.  
 Hot Water .. .. 1 pt.

The mouth may be washed out night and morning with a little of either of the above.

Pars. 228, 230, 231, 232, 236, 237.

## EYE LOTION.

IV.	Boracic Acid	..	..	..	1 dr.
	Wine of Opium	..	..	..	2 dr.
	Rose Water	..	..	..	2 oz.
	Distilled Water	..	..	..	6 oz.

Mix, and apply a little night and morning with a clean sponge.  
 Pars. 634, 636, 637, 645.

## IODINE LOTION OR SOLUTION.

V.	Iodine	..	..	..	1 dr.
	Iodide of Potassium	..	..	..	2 dr.
	Cold Water	..	..	..	1 pt.

To be applied with a feather.  
 Pars. 335, 337, 338.

## 1070. PURGING OR PHYSIC BALLS FOR HORSES.

I.	Powdered Barbadoes Aloes	..	..	4-8 dr.
	Powdered Ginger	..	..	1-2 dr.

Mix, and make into one ball with a little honey. As a laxative or aperient, from one-quarter to one-half can be given.

Par. 244.

## PURGATIVE MEDICINE FOR COW.

II.	Epsom or Glauber Salts	..	16-20 oz.
	Mixed Carminatives ( <i>Par.</i> 1019)	..	4 oz.

For a laxative from one-quarter to one-half to be used.

Mix, and give in thin gruel.

Par. 300.

## 1071. RINGWORM MIXTURE FOR HORSE AND COW.

	Flowers of Sulphur	..	..	4 oz.
	Spirits of Tar	..	..	8 oz.
	Whale Oil (Train Oil)	..	..	1 qt.

Mix together, and apply with a brush.

Par. 683.

## 1072. TAR OINTMENT.

	Hard Fat or Palm Oil	..	..	3 lb.
	Green Tar	..	..	1 lb.

Melt over a slow fire, and stir well together.

Pars. 193, 194, 203.

## 1073. TONICS AND TONIC DIURETICS FOR HORSE.

## For One Ball—

I.	Nitrate of Potash	..	..	4 dr.
	Powdered Resin	..	..	2 dr.
	Powdered Digitalis	..	..	1 dr.
	Sulphate of Iron	..	..	1 dr.
	Oil of Juniper	..	..	1 dr.

Make into a ball with soft soap, and give daily for four to six days.

Or a simple *powder* can also be made up with—

II.	Nitrate of Potash ..	..	..	4 dr.
	Carbonate of Iron ..	..	..	2 dr.

This may be given in a mash each night for six nights. The above powder also answers for ailments referred to in  
Pars. 438, 444, 452, 456.

#### IODINE AND IRON TONIC POWDERS FOR HORSE AND COW.

III.	Iodide of Potassium ..	..	..	2 dr.
	Exsiccated Iron ..	..	..	1 dr.
	Nux Vomica ..	..	..	1 dr.

Mix, and give once a day in the food.

Pars. 315, 438, 442, 444, 452, 454, 456, 517, 526.

#### ALKALINE TONIC POWDERS FOR HORSE AND COW.

IV.	Carbonate of Soda ..	..	..	4 dr.
	Carbonate of Iron ..	..	..	2 dr.
	Powdered Nux Vomica ..	..	..	1 dr.
	Powdered Fenugreek ..	..	..	2 dr.

Mix, and give each night in the food, or as a drench in 1 pint of water.

Pars. 245, 310, 318, 367.

#### 1074. WORM MEDICINES.

##### I. WORM DRAUGHT FOR HORSE OR COW :

	Turpentine ..	..	..	2-4 oz.
	Raw Linseed Oil ..	..	..	1 pt.

Mix, and give as a drench in the morning once a week until four doses have been given.

##### II. WORM POWDER FOR HORSE OR COW :

	Flowers of Sulphur ..	..	..	$\frac{1}{2}$ oz.
	Common Salt ..	..	..	$\frac{1}{2}$ oz.
	Sulphate of Iron ..	..	..	1 dr.

Mix, and give in the food once a day for a fortnight.

##### III. WORM POWDER FOR AN ADULT SHEEP :

One-fourth of the foregoing quantities can be given.

##### IV. WORM POWDER FOR THE PIG :

SANTONIN, from 3 to 10 grains in the food, can be given three times in a fortnight,

##### V. WORM POWDER FOR THE DOG :

Powdered ARECA NUT,  $\frac{1}{2}$  to 1 drachm, to be given in milk after twenty-four hours' fasting, and follow with—

	Syrup of Buckthorn ..	..	..	$\frac{1}{2}$ oz.
	Castor Oil ..	..	..	$\frac{1}{2}$ oz.

Pars. 252, 253, 276, 277, 283, 310, 592.

VI. For FLUKES in the liver of cattle and sheep, common salt is the best agent.

VII. For PARASITES in the respiratory organs, fumigations of sulphur, chlorine, and iodine are resorted to.

Pars. 340, 341, 549.



# A LIST IN TABULATED FORM OF SOME OF THE MEDICINES AND THEIR DOSES COMMONLY USED FOR THE HORSE, COW, SHEEP, PIG AND DOG.

1075. The doses are for ordinary adult animals, and can be increased or diminished, as the case may be. For younger animals the doses must be regulated according to age. Thus, for a horse three years old and upwards, cow and sheep two years, pig one and a half years, dog one year old give full doses as per table; for an animal half the above ages give half the quantity of medicine, and so on, as example—

Horse three years old	..	..	..	Give full dose.
„ one and a half years old	..	..	..	Half the dose.
„ nine months old	..	..	..	One-fourth the dose.
„ four and a half months old	..	..	..	One-eighth the dose.

## FOR THE COW FROM A QUARTER TO HALF AS MUCH MORE AS THAT NAMED ON THE FIRST COLUMN FOR THE HORSE.

The terms used in the annexed columns may be understood as follows :

Oz. stands for Ounce ; Dr. for Drachm ; Gr. for Grain ; Dp. for Drop.

MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Æther, Sulphuric ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	—	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	20-60 dp.
Aloes ..	2-8 dr. ..	—	2-4 dr. ..	15-60 gr.
Alum ..	2-4 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	20-60 gr. ..	10-20 gr.
Aniseed ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-2 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-30 gr.
Antimony, Black ..	1-3 dr. ..	10-30 gr. ..	7-20 gr. ..	3-10 gr.
Antimony, Tartarised (Tartar Emetic)	{ Worms,	—	Emetic, 4-12 gr. ..	Emetic, 2-6 gr.
	{ 1-3 dr. ..			
	{ Febrifuge, $\frac{1}{2}$ -2 dr. ..			
Areca Nut ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	2-6 gr. ..	1-3 gr. ..	1-2 gr.
Aromatic Spirits of	1-3 dr. ..	1-3 dr. ..	$\frac{1}{2}$ -2 dr. ..	$\frac{1}{2}$ -2 dr.
ammonia ..	$\frac{1}{2}$ -2 oz. ..	1-2 dr. ..	$\frac{1}{2}$ -2 dr. ..	20-60 dp.
Assafoetida ..	2-6 dr. ..	1-2 dr. ..	15-60 gr. ..	5-20 gr.
Belladonna Extract	$\frac{1}{2}$ -2 dr. ..	5-10 gr. ..	2-6 gr. ..	1-4 gr.
Bicarbonate of Soda	$\frac{1}{2}$ -1 oz. ..	1-2 dr. ..	1-2 dr. ..	20-60 gr.
Bicarbonate of Potash	$\frac{1}{2}$ -1 oz. ..	1-2 dr. ..	1-2 dr. ..	20-40 gr.
Boracic Acid ..	1-3 dr. ..	10-30 gr. ..	10-20 gr. ..	5-10 gr.
Bromide of Ammonia	1-3 dr. ..	10-30 gr. ..	10-20 gr. ..	5-10 gr.
Bromide of Potassium	2-6 dr. ..	$\frac{1}{2}$ -2 dr. ..	$\frac{1}{4}$ -1 dr. ..	10-20 gr.

MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Carbonate of Iron ..	1-3 dr. ..	15-30 gr. ..	10-20 gr. ..	5-10 gr.
Carbonate of Ammonia .. ..	2-8 dr. ..	15-30 gr. ..	10-20 gr. ..	5-10 gr.
Carbonate of Magnesia .. ..	1-6 dr. ..	30-60 gr. ..	20-60 gr. ..	10-20 gr.
Castor Oil (purgative) .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ pt. ..	2-8 oz. ..	1-3 oz. ..	$\frac{1}{2}$ -2 oz.
Calumba Powder ..	2-6 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-60 gr. ..	10-20 gr.
Calomel .. ..	15-60 gr. ..	4-10 gr. ..	2-7 gr. ..	$\frac{1}{2}$ -2 gr.
Caraway .. ..	$\frac{1}{2}$ -2 oz. ..	1-2 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	10-30 gr.
Cantharides .. ..	5-10 gr. ..	2-6 gr. ..	1-4 gr. ..	$\frac{1}{2}$ -2 gr.
Camphor .. ..	1-3 dr. ..	10-30 gr. ..	8-20 gr. ..	3-10 gr.
Carbolic Acid .. ..	$\frac{1}{2}$ -2 dr. ..	10-20 dp. ..	6-15 dp. ..	4-8 dp.
Cayenne Pepper ..	1-4 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-60 gr. ..	8-30 gr.
Chalk .. ..	$\frac{1}{2}$ -2 oz. ..	1-2 dr. ..	$\frac{1}{2}$ -2 dr. ..	$\frac{1}{2}$ -1 dr.
Chloride of Ammonia ..	2-6 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	15-60 gr. ..	10-20 gr.
Chloride of Lime ..	2-6 dr. ..	15-60 gr. ..	10-45 gr. ..	6-20 gr.
Chinosol .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	8-20 gr. ..	5-12 gr. ..	3-6 gr.
Charcoal .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-2 dr. ..	$\frac{1}{2}$ -2 dr. ..	$\frac{1}{2}$ -1 dr.
Chloride of Sodium { (Common Salt) .. {	$\frac{1}{2}$ -2 oz. .. Cow. 8-16 oz.	} 1 $\frac{1}{2}$ -3 dr. ..	{ 1-2 dr. Emetic }	} 20-60 gr.
Chloral Hydrate ..	2-8 dr. ..			
Chloroform .. ..	1-2 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	15-60 gr. ..	8-30 gr.
Chlorodyne .. ..	1-2 dr. ..	10-30 dp. ..	8-20 dp. ..	3-10 dp.
Chlorate of Potash ..	2-8 dr. ..	10-60 dp. ..	10-30 dp. ..	3-15 dp.
Cocaine .. ..	1-3 dr. ..	10-30 gr. ..	10-20 gr. ..	3-10 gr.
Cod-Liver Oil ..	2-8 gr. ..	1-3 gr. ..	$\frac{1}{2}$ -2 gr. ..	$\frac{1}{8}$ -1 gr.
Coriander Powder ..	2-8 oz. ..	3-8 dr. ..	2-6 dr. ..	1-5 dr.
Croton Oil .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-2 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	20-60 gr.
Croton Oil .. ..	5-10 dp. ..	2-4 dp. ..	5-10 dp. ..	$\frac{1}{2}$ -2 dp.
Cream of Tartar ..	1-3 oz. ..	2-5 dr. ..	1-3 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr.
Easton's Syrup ..	$\frac{1}{2}$ -2 oz. ..	2-3 dr. ..	1-2 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr.
Epsom Salts (Sulphate of Magnesia)				
—purgative .. ..	$\frac{1}{2}$ -1 lb. ..	1-4 oz. ..	$\frac{1}{2}$ -2 oz. ..	1-4 dr.
Ditto. .. ..	1-3 oz. ..	as Febrifuge for	Horse and	Cow.
Ergot of Rye .. ..	$\frac{1}{2}$ -1 oz. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	$\frac{1}{2}$ -1 dr. ..	10-30 gr.
Eucalyptus .. ..	$\frac{1}{2}$ -1 dr. ..	10-20 dp. ..	8-12 dp. ..	2-6 dp.
Gentian (powdered) ..	2-8 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-60 gr. ..	7-20 gr.
Ginger (powdered) ..	2-8 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-60 gr. ..	7-20 gr.
Glycerine .. ..	2-5 oz. ..	3-8 dr. ..	2-5 dr. ..	1-3 dr.
Glauber Salts (Sulphate of Soda)— purgative) .. ..	$\frac{1}{2}$ -1 lb. ..	1-4 dr. ..	—	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr.
Ditto. .. ..	1-3 oz. ..	Febrifuge for	Horse and	Cow.

## APPENDIX B

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MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Hydrochloric Acid (dilute) .. ..	1-3 dr. ..	10-30 dp. ..	10-20 dp. ..	4-10 dp.
Hyposulphite of Soda	$\frac{1}{2}$ -4 oz. ..	1-4 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	15-45 gr.
Iodine .. ..	10-60 gr. ..	2-5 gr. ..	1-3 gr. ..	$\frac{1}{2}$ -2 gr.
Iodide of Potassium	$\frac{1}{2}$ -2 dr. ..	10-30 gr. ..	4-20 gr. ..	2-10 gr.
Iodoform .. ..	1 $\frac{1}{2}$ -2 dr. ..	15-30 gr. ..	10-20 gr. ..	6-10 gr.
Jalap .. ..	—	—	1-3 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr.
Juniper Berries ..	$\frac{1}{2}$ -2 oz. ..	1-3 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-60 gr.
Laudanum (Tincture of Opium) ..	1-4 oz. ..	1-4 dr. ..	$\frac{1}{2}$ -2 dr. ..	10-25 dp.
Liquor Ammonia, Acetatis (dilute) ..	2-6 oz. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	2-8 dr. ..	1-3 dr.
Linseed Oil (purga- tive) .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ pt. ..	3-10 oz. ..	2-6 oz. ..	1-2 oz.
Male Fern (Liquid Extract) .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-3 dr. ..	$\frac{1}{2}$ -2 dr. ..	15-35 dp.
Morphia .. ..	5-10 gr. ..	1-2 gr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ gr. ..	$\frac{1}{2}$ - $\frac{1}{4}$ gr.
Mustard .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-2 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	{ 14-20 gr. Emetic, 2-5 dr.
Nitrate of Potash (Saltpetre) — febrifuge	1-4 dr. ..	10-35 gr. ..	8-20 gr. ..	3-10 gr.
Ditto (diuretic) ..	Twice the	above doses.		
Nitric Acid (dilute) ..	1-3 dr. ..	12-35 dp. ..	8-20 dp. ..	4-10 dp.
Nux Vomica .. ..	20-60 gr. ..	3-15 gr. ..	2-10 gr. ..	1-3 gr.
Oak Bark (powdered)	2-5 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	15-60 gr. ..	8-20 gr.
Oil of Juniper .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	8-20 dp. ..	5-16 dp. ..	2-5 dp.
Oil of Mint .. ..	20-60 dp. ..	5-10 dp. ..	4-7 dp. ..	1-3 dp.
Opium (powdered) ..	1-2 dr. ..	6-30 gr. ..	5-20 gr. ..	1-5 gr.
Pimento Powder (Sweet Pepper) ..	2-6 dr. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	20-60 gr. ..	8-20 gr.
Pepper (black) .. ..	1-3 dr. ..	15-30 gr. ..	8-20 gr. ..	4-12 gr.
Pepper (white) .. ..	1-3 dr. ..	15-30 gr. ..	8-20 gr. ..	4-12 gr.
Quassia Powder .. ..	3-6 dr. ..	$\frac{1}{2}$ -1 dr. ..	20-30 gr. ..	8-20 gr.
Quinine (Sulphate) ..	$\frac{1}{4}$ -2 dr. ..	5-15 gr. ..	3-10 gr. ..	2-5 gr.
Resin .. ..	$\frac{1}{2}$ -1 oz. ..	1-1 $\frac{1}{2}$ dr. ..	$\frac{1}{2}$ -1 dr. ..	15-30 gr.
Rhubarb (powdered)	$\frac{1}{4}$ -1 oz. ..	2-3 dr. ..	1-2 dr. ..	15-30 gr.

MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Santonin .. ..	15-40 gr. ..	3-15 gr. ..	2-10 gr. ..	1-5 gr.
Salicylate of Soda ..	2-4 dr. ..	25-45 gr. ..	15-30 gr. ..	7-20 gr.
Spirits of Nitre ..	$\frac{1}{2}$ -3 oz. ..	2-4 dr. ..	1-3 dr. ..	20-60 dp.
Subnitrate of Bismuth	1-2 dr. ..	10-30 gr. ..	7-20 gr. ..	3-10 gr.
Sulphur (Flowers) ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-2 dr. ..	1-4 dr. ..	20-60 gr.
Sulphate of Iron ..	1-3 dr. ..	15-30 gr. ..	8-20 gr. ..	5-10 gr.
Sulphuric Acid (dilute)	1-3 dr. ..	15-30 dp. ..	8-20 dp. ..	4-10 dp.
Sulphate of Copper ..	$\frac{1}{2}$ -2 dr. ..	10-15 gr. ..	5-10 gr. ..	1-3 gr.
Sulphate of Zinc ..	$\frac{1}{2}$ -2 dr. ..	8-15 gr. ..	4-10 gr. ..	1-3 gr.
Sugar of Lead ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	10-25 gr. ..	4-15 gr. ..	1-3 gr.
Syrup of Buckthorn	—	—	—	$\frac{1}{2}$ -2 oz.
Syrup of Squills ..	1-2 oz. ..	1-3 dr. ..	1-2 dr. ..	{ Cat, 1-2 dr. $\frac{1}{2}$ -1 dr.
Tannic Acid .. ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ dr. ..	10-20 gr. ..	8-16 gr. ..	2-6 gr.
Tincture of Aconite (Fleming's) ..	10-25 dp. ..	2-8 dp. ..	2-6 dp. ..	1-3 dp.
Tincture of Arnica ..	$\frac{1}{2}$ -1 $\frac{1}{2}$ oz. ..	1-1 $\frac{1}{2}$ dr. ..	$\frac{1}{2}$ -1 dr. ..	10-20 dp.
Tincture of Benzoin	$\frac{1}{2}$ -2 oz. ..	1-3 dr. ..	1-2 dr. ..	15-35 dp.
Tincture of Catechu	$\frac{1}{2}$ -2 oz. ..	1-4 dr. ..	1-3 dr. ..	1-1 $\frac{1}{2}$ dr.
Tincture of Ginger ..	$\frac{1}{2}$ -2 oz. ..	2-4 dr. ..	1-1 $\frac{1}{2}$ dr. ..	15-25 dp.
Tincture of Iron ..	$\frac{1}{2}$ -4 dr. ..	10-60 dp. ..	5-20 dp. ..	3-10 dp.
Turpentine .. ..	$\frac{1}{2}$ -2 oz. ..	1-4 dr. ..	$\frac{1}{2}$ -1 dr. ..	20-50 dp.

## 1076. WEIGHTS, MEASURES, AND OTHER SUBSTITUTES :

One small Dessertspoonful .. ..	One-quarter of an ounce.
One small Teaspoonful .. ..	One-eighth of an ounce (or one drachm).
Sixty Grains or Minims (Drops) .. ..	One drachm.
One small Tablespoonful .. ..	One half-ounce.
Two small Tablespoonfuls .. ..	One ounce.
One small (sherry) Wineglassful .. ..	Two ounces.
One Teacupful .. ..	Six ounces.
One Breakfastcupful .. ..	Ten ounces or half-pint.

As spoons and glasses vary very much in size, the smallest must be used to represent the above.

## APPENDIX C

### VARIOUS FORMS OF MANUAL AID

1077. BALLS, BOLUSES, PILLS, are the most convenient forms of administering medicines to horses and dogs. To prepare a *ball for a horse* the medicinal agents are mixed together with a little linseed meal, and beat up into a paste in a mortar, with the addition of honey, treacle, or soft-soap, and rolled into a cylindrical mass about  $\frac{3}{4}$  inch in diameter, then cut into lengths about 3 inches each, and either folded into fine paper, secured at each end, or put into a gelatine capsule. *Pills for dogs* are prepared somewhat similarly, but much less in size. In administering the ball to the horse, the operator stands to the right or *off-side* and rather to the front, and with the left hand takes hold of the horse's tongue and gently pulls the point of the tongue to the outside of the mouth, and with the ball fixed between the three first fingers of the right hand, passes it quickly along the roof of the mouth to the back of the throat and leaves it, then withdraws the hand from the mouth, releases the tongue, and holds the jaws firm and close together by the aid of the left hand on the nose and the right on the under jaw, and looks for the ball to pass down the gullet on the near or *left side*. Or the mouth may be kept open with the balling-iron (*Plate XXXIII., Fig. 5*), the tongue held, and the ball put in as above. A balling-gun (*Plate LIV., Fig. 1*) is sometimes used instead of the hand to place the ball at the back of the mouth. To give a pill to a dog, place the left hand over the nose, just below the eyes, and press the cheek of the left side against the upper teeth with the fingers, and the cheek of the right side with the thumb, when the dog will himself open his mouth wide enough for the pill to be put into the back part of the throat with the thumb and forefinger of the right hand.

1078. BEDDING.—It is important that animals should have clean, dry beds. For this purpose *straw* is mostly used, both in stall and box. When straw is scarce the bedding should be well dried in the fresh air every day. *Sawdust* is now extensively used in large towns, also *moss-litter*, and both answer well. For boxes we prefer the *moss-litter* for horses and cattle; it keeps down bad smells, absorbs moisture and ground damp. In outlying districts dried bracken and dried rushes are much used for bedding.

1079. **BLEEDING**, when judiciously performed, has a quick and decidedly beneficial effect, as in acute attacks of fever, inflammation, azoturia, etc. The operation is generally performed by the aid of a lancet or fleam. A cord is put round the neck of the horse or cow, close to the breast, and pulled tight, until the jugular vein running down the neck is seen to rise and become full and tense. The point of the blade of the fleam is then placed lightly on the distended vein, and with a sharp stroke with a bleeding-stick on the back of the fleam the blade is driven into the vein, when the blood flows out; after drawing from 3 to 6 quarts of blood, or what is necessary, the cord is removed from the neck, and the lips of the wound closed by putting a pin through them and holding it in its place, with a piece of cord twisted round the ends like the figure of eight.

1080. **BULL-DOG**, or **BULL-GRIP**, is an instrument used for restraining cattle; the action is somewhat similar to the *twitch* for the horse. It resembles a pair of pincers, with bulbs on the ends of the mouth or grip. When opened, one bulb is put into the end of each nostril; they are then closed on to the partition dividing the nose, and held tight by a screw, or spring and slide. In many minor operations this is the only instrument used for restraint, or more frequently the thumb and finger of an attendant is used in the same manner to steady the animal.

1081. **CASTING**.—When some operations have to be performed it is necessary to cast the animal. There are various methods. For the **HORSE**, the most simple is that known as the side-lines. A good strong, soft hemp rope, about twenty to twenty-five yards long, is doubled at the middle, where a loop is made to go round the animal's neck, close to and in front of the shoulders, with the free ends of the rope hanging from the lower side of the loop. These ends are passed between the fore-legs, one to the left and the other to the right, and are each carried to their respective sides, round each hind pastern from the outside to the inside, passing the rope underneath the line running from between the fore-legs, then up to and across the side of the shoulder through the loop round the neck. The assistants on the right side stand in front of the horse, and those on the left stand behind. When the ropes are pulled, and the animal is cast, the head must be kept well back. The hind-legs are then made fast by pulling the feet forward close up to each side of the chest, and making a hitch round the pasterns; the fore-legs are then secured by passing the rope round each pastern at their respective sides, and tying them to the hind pasterns. Special hobbles are also made of strong leather, and put round the pasterns of each leg, and held together by loops through which a chain or rope is passed. The legs are pulled together and the animal is thrown. For the **Cow**, make a loop at the end of a good strong cart-rope. Put the loop over the head of the animal, carry it down to and in front of the shoulders, taking care not to have it too tight. Place the knot in the loop on the side of the neck; the rope is then carried along the side of the shoulder, and over the back just behind the shoulder, and under the chest; then make a half-hitch by putting the long end of the rope through the part coming from the neck loop; pass the rope along the side and put it over the loins, around and under the belly, in front of the udder in the female, and in front of the sheath in the male, bringing

it up and making another half-hitch on a line with the first. The free end is next carried behind and pulled ; the animal quietly lies down. A number of operations can be performed under this method of restraint.

1082. **CHARGES, or PLASTER BANDAGES**, are agents which act as external supporters, and in many cases they have a decided beneficial action, such as in wind-galls, bog-spavin, thoroughpin, and sprung tendons. The most convenient charge is made by melting over a slow fire 2 parts of black pitch and 1 part of Stockholm tar ; stir well together, and when nearly cool smear over the parts. Plaster bandages are now greatly used for the support of sprung tendons and weak shanks. They are specially made from adhesive matters, in various lengths, breadths, and colours.
1083. **CHLOROFORM BAG** is an ordinary leather bag resembling a muzzle, and is fixed on to the nose of the animal by a leather strap put behind the ears ; a sponge saturated with chloroform is put into the bottom of the bag, and to prevent the fumes escaping a towel is rolled round the top of the bag. A special chloroform muzzle invented by my old master, the late Mr. Joseph Carlisle, is the best and handiest. Previous to administering the chloroform the animal should be cast and properly secured, to prevent it injuring itself when the chloroform is taking effect and passing off.
1084. **CRADLE.**—This is a simple appliance made of cylindrical pieces of wood or bamboo, about  $1\frac{1}{2}$  inches in diameter, and varying in length from 15 to 20 inches, and about eight to twelve in number. They are fastened together by cords, with intervening spaces, and put round the horse's neck to prevent it biting or rubbing the parts, after firing and blistering.
1085. **DOCKING** is the amputation of a portion of the tail of young horses. Although it is considered by many to be an act of cruelty, the operation is now more in vogue than it was in former years. There are various arguments for and against docking, also at what age it is best to operate. In performing the operation, a portion of the tail, varying in length, is selected, the hair is clipped off round the part, and the amputation is best done by a special docking knife or scissors, and the bleeding stopped by the application of the hot docking-iron. All the instruments must be scrupulously clean, as both lock-jaw and blood-poisoning occasionally follow docking.
1086. **DRENCHES, DRAUGHTS, DRINKS.**—When medicines are too bulky to give as a ball, the ingredients are mixed together and suspended in cold or warm water, thin gruel, warm ale, or in linseed or castor oils, and given as a drench. The majority of medicines are administered in this form to cattle, sheep, and pigs in particular. In drenching a horse, buckle the ends of a narrow leather strap together in the form of a loop ; put one portion into the mouth of the horse behind the incisor teeth ; the other part is then carried over the nose close up to the eyes, through which put one of the prongs of a stable fork, to be held by an assistant standing on the left or near side. By raising the prong end of the fork, the head is

elevated, and the draught then administered by the aid of a special tin drenching-bottle or a long-necked glass bottle, the neck of the bottle being inserted into the mouth on the off side, and the contents of the bottle emptied slowly and carefully into the mouth. The *Cow* is best drenched with the old-fashioned drenching-horn. The head of the cow is steadied by an assistant standing on the left side and taking a firm hold of the horns, while the operator, standing on the cow's right side, passes his left arm round the forehead of the animal and puts his fingers into her mouth on the left side, takes a firm hold of the upper jaw, and with the right hand the open end of the drenching-horn is inserted into the mouth, the head elevated, and the contents of the horn delivered to the back part of the mouth. A bottle may be used instead of the horn. The *Pig* is best drenched by holding it by the ears, and inserting well into the mouth an old strong-soled or wood-soled shoe, with a small hole in the toe (*Plate LIV.*, *Fig. 3*). Hold the shoe firmly in the mouth, and pour the draught down the inside of it. In drenching the *Dog*, tie the upper and lower jaws together with a piece of tape, and with the fingers pull the cheek out behind the tape, and with a long-necked bottle—small as possible—pass the draught between the cheek and back teeth. The pig can also be drenched by this method as well.

1087. **ELECTUARIES** are medical agents mixed up and made into a paste or mass, with honey, treacle, jellies, etc., and used in cases of sore throat, or where it is dangerous to administer balls or draughts. A piece of the mass is rubbed on the upper surface of the tongue, or on the roof of the mouth, three or four times a day, when it is sucked in by the patient. It is thought by many to have a soothing effect.
1088. **ENEMAS, CLYSTERS, or INJECTIONS**, are valuable agents, and are made with cold or warm water, soap and water, tobacco infusion, solution of aloes, etc., according to the purpose required. They are injected into the bowel by the means of a large special syringe, or a funnel pipe (*Plate LIV.*, *Fig. 4*), or by a funnel fixed on to a long or short flexible indiarubber tube; also by the injection pump, or by an ordinary indiarubber enema syringe. Warm water or warm water and glycerine are mostly used.
1089. **FIRING** is performed by specially made instruments, which are heated in the fire to a deep-red heat, and lines are drawn over the diseased part with the hot-iron, or the part is punctured by a pointed instrument made hot. The operation can also be done by electricity with the thermo-cautery. Firing hurries on the process of reparative inflammation in disease of the bones, tendons, and joints, and also increases the power of absorption.
1090. **FOMENTATIONS** are accomplished by warm, soothing agents applied to a damaged or diseased part, and mainly consist of warm water, to which medical agents may be added, according to circumstances. The process can be performed by simply bathing the parts with a sponge or cloth, applying woollen rugs wrung out of hot water, and by poultices, or spongio-piline.
1091. **FUMIGATIONS** are now extensively employed for the destruction of disease-producing germs, parasitic pests, and for disinfecting stables and



other buildings. The agents mostly used for fumigations are : Chlorine gas, iodine, sulphur, and formalin fumes. Chlorine gas is liberated by mixing equal parts of common salt and black oxide of manganese in an earthenware jar, to which is added 2 parts each of vitriol and water. Sulphur fumes are generated by burning roll sulphur in an old pan, or by sulphur candles. Iodine fumigations are made by putting 1 or more drachms of iodine on a piece of hot iron or hot brick. Formalin tablets are placed in a special crucible, and by the aid of a spirit-lamp the fumes are liberated. When fumigating buildings all the animals must be removed, and the openings, windows and doors tightly closed ; after the fumigation the doors, windows, and ventilators must be freely opened before the animals are again admitted.

1092. **HYPODERMIC INJECTIONS.**—The method of giving medicine by injecting it through the skin is one of the greatest boons in medical science, and is now largely practised. It is found that by injecting certain medicinal agents in solution—which for this purpose are very numerous—under the skin, they establish their action more quickly than when they are inhaled by the lungs. They are carried direct into the blood without undergoing any chemical changes, which they are very apt to do when given by the mouth. The operation is very simple, and is performed by the aid of a graduated glass-barrelled syringe, with a fine hollow needle, fitted on to the nozzle of the syringe. The instrument in all cases must be kept scrupulously clean. The most convenient places for inserting the needle and injecting the medicine are in front of the breast or behind the elbow, where the skin is fine and thin.

1093. **INHALATIONS** are mostly used for soothing or stimulating the cavities of the head and air-passages, also for the destruction of parasites in the windpipe and bronchial tubes. For cold in the head, laryngitis, and bronchitis, they are highly serviceable. The most common is the warm, moist air from a steam-kettle, or the steam vapour from a hot mash or a sop of hay in the bottom of a stable bucket, the nose of the horse being held over it for twenty minutes three or four times a day. The action is very much benefited when about one tablespoonful of camphor shavings, turpentine, carbolic acid, or oil of eucalyptus, is put amongst the hay before pouring on the hot water.

1094. **INSUFFLATORS** are hollow tubes, made either of vulcanite, wood, japanned tin, or indiarubber, with a glass nozzle. They are of various lengths and shapes. The ordinary nasal insufflator is a hollow vulcanite tube about 9 inches long, with an indiarubber ball, having a hole in it, fixed to the broad end of the tube. It is used for inserting dry dressings, such as iodoform, into wounds, and the nose or ear. The dressing is put into an opening in the side of the tube near the broad end ; this is covered by a slide. The small end of the instrument is inserted into the nose, ear, etc. ; the rubber ball is then pressed, and the dressing is distributed into the affected parts.

1095. **INOCULATIONS, VACCINES, OR ANTITOXINE TREATMENT.**—These agents are said to have a protecting influence, and prevent the disease-producing organisms invading the body. The vaccines or serums are prepared by

cultivating the microbes that cause the disease, in certain media, or by inoculating animals with the microbes, and so, by passing them through their bodies, producing an attenuated form of vaccine. They are used to prevent as well as to cure diseases.

1096. **RESTRAINT ROPE FOR THE HORSE.**—Put the horse loose into a stall, but with a halter on the head and twitch on the nose. Double a strong cart-rope, and tie the loop end to the ring in the manger, or to the staps of the hayrick; then twist the loose ends of the rope together, and carry behind the thighs, above the hock; here make a loop in the rope, and pass the ends over the top of the stall division and around the stall post, putting the free end of the rope through the loop behind the thighs, one or two attendants pulling the rope tight. Firing the hind-legs can frequently be accomplished under this method. If possible, operate on the leg next to the boards, then change sides for the other leg. For the Cow, a ready mode of restraint is to put a strong, soft rope around the body of the animal, over the loins and in front of the udder, or the sheath in the male. Tie the ends of the rope securely, and put a strong walking-stick under the rope on one side of the spine, and twist the stick round and round until the rope is sufficiently tight. This will prevent the animal from kicking, and keep it quiet during the operation. Another method is to tie a piece of rope, about 5 feet long, around the hind-legs; the middle of the rope is put around the outside of the left hind-leg above the hock, and the ends brought between the legs and twisted, bringing one end in front of the right hock and the other behind, and knotting together on the outside.

1097. **SETONS** are occasionally used to set up counter-irritation for the removal of deep-seated inflammations, and to drain off the contents of a watery cyst or an abscess; also to act as an alterative, as well as a prophylactic measure against *black-quarter* in cattle. The seton consists of a piece of linen tape, smeared over with some digestive or blister ointment, and inserted under the skin by a special needle, and secured by tying the ends of the tape together, or by attaching to each end of the tape a small piece of wood or a pledget of cloth. The tape should be moved and dressed with some antiseptic oil twice a week.

1098. **SLINGING.**—This method of giving mechanical support to the horse is frequently resorted to. The slings should be made of good strong double canvas, about 5 feet long and 2 feet 6 inches wide, and fixed at each end to a horizontal bar of wood or iron, with loops or rings at each end of the two bars, to which ropes, chains, or pulleys are attached, and fixed to overhead beams. A good strong, broad leather breast and neck strap and broad breeching band behind are required to keep the patient in its place. It is not necessary to suspend the animal; the slings are only for support, and to keep the patient steady and prevent it falling. This appliance is of great service in cases of tetanus or when extensive injury has been done to the limbs or other portions of the body. A good strong indiarubber bag or bed filled with air and placed in the centre and sides of the slings affords great comfort to the patient, and prevents chafing of the skin.

1099. SLINGING THE HIND-QUARTERS IN DIFFICULT PARTURITION, OR IN EVERSION OF THE WOMB.—First fix a good pulley-block to a beam above the patient, then double a good strong, soft cart-rope. Raise the hind-quarters, and, with the loop end of the rope facing the back of the animal, draw the rope under the quarter on which the patient is lying, until one portion of the rope is pulled in front of the haunch-bone, the other part being beneath the quarter, half-way between the root of the tail and haunch point. The two free ends are now situated under the hind-legs, one of which must be fixed to the left hind-leg, and the other to the right by means of two half-hitches around the hock, one being above and the other below the joint; then carry the two ends over the upper quarter, and pass them through the loop end; pull tight, and tie them securely. Hook on the pulley-block and raise gently, packing bags of chaff or bundles of straw under the lower quarter to assist in maintaining the animal in position. Or, again, a good strong sack may be used, and to make it secure and to prevent the ropes slipping, pieces of old rags rolled into a ball, or a medium-sized potato, should be tied into each of the four corners of the sack. The sack is then drawn underneath the quarter on which the animal is lying, one end towards the back, and the other towards and under the hind-legs. Get the front edge of the bag well forward and in front of the haunch, and front of the stifle joint on which the animal is lying; the other two corners of the sack should be one above the root of the tail and the other behind the thigh. The four corners of the sack are then tied securely together with a strong rope over the upper quarter. Hook the ropes on the pulley-block and raise up, supporting the under quarter with bundles of straw or bags of chaff.

1100. THERMOMETER READING.—The clinical thermometer should be in the possession of every owner of stock; by its use the state of the body is best indicated. The mercury in the instrument is shaken down to 95°. The mercury end of the thermometer is then introduced into the rectum of the animal, and held there for three minutes, unless the instrument has a special registration period. The Fahrenheit registration of the thermometer is most commonly in use, but the Centigrade is also given. The normal temperatures of healthy animals are as follows:—

FAHRENHEIT.					CENTIGRADE.
Horse	..	..	100-101°	..	37·7-38·3°
Cow	..	..	101-102	..	38·3-38·8
Sheep	..	..	103-104	..	39·4-40·0
Pig	..	..	102-103	..	38·8-39·4
Dog	..	..	101-102	..	38·3-38·8
Cat	..	..	100-101	..	37·7-38·3
Poultry	..	..	105-106	..	40·5-41·1

1101. TRACHEOTOMY, OR OPENING INTO THE TRACHEA OR WINDPIPE.—This operation is of great service in bad cases of *roaring*, or when there is difficulty in breathing from the formation of abscesses around the throat, as in *strangles*. The operation is very simple. An opening is made through the skin and flesh into the windpipe about 9 to 12 inches from the angle of the throat, and a tube is put into the opening (*Plate LIV.*,

*Fig. 7).* Sometimes the windpipe is slit open, and at others a piece about the size of a shilling is removed, and the tube inserted. The tube has to be removed and thoroughly cleaned two or three times a week.

1102. TWITCH.—This may be looked upon as a mechanical anæsthetic when put on the tip of the nose and upper lip, or the ear. It has a wonderful effect in keeping the horse quiet, and when used numerous minor operations can be performed without much trouble. The ordinary mode of making a twitch is by boring a hole through the end of a piece of wood—a portion of a stable-fork shank—about 18 to 24 inches long, putting a piece of cord through the hole, and knotting the two ends together; the cord is then fixed on the upper lip and tip of the nose, and twisted up to get a firm hold.

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